Scientific American.

A WEEKLY JOURNAL OF PRACTICAL INFORMATION IN ART, SCIENCE, MECHANICS, CHEMISTRY AND MANUFACTURES.

Vol. X.---No. 19. (NEW SERIES.) NEW YORK, MAY 7, 1864. SINGLE COPIES SIX CENTS. $3 PER ANNUM—IN ADVANCE.

Improved Manure-spreader.

Farmers are very generally acknowledging the importance of manuring the soil in order to retain its fertility and produce better crops. The usual method of procedure in manuring ground is well known, and practical farmers will, we think, appreciate this improvement upon the former slow and tedious process.

The machine illustrated herewith in Figs. 1 and 2, consists of a wagon mounted on wheels and provided with a movable bottom; this bottom is formed like an endless apron of a series of slats, A, arranged to slide over rollers, B, shown in Fig. 2. This apron has ropes attached to its extreme ends, which are wound in opposite directions upon the shaft, C, just behind the wagon body. This shaft is connected by a train of gears, D, with a gear upon the axle, E, so that as the vehicle advances the shaft will rotate slowly and cause the apron or loose bottom to advance toward the forks. These gears are thrown in and out of connection with the driving wheel by the lever, F, which has a pin and hook at G, so as to keep the wheels together when they are thrown in. The forks, H, are connected in the center to the crank shaft, I, and at the bottom the frame, J, they set in, has two rods, K, which slide through slots in the cross-brace, L. The effect of this arrangement is to produce a hooking or a clawing motion of the forks well adapted to the duty they have to perform, for by the revolution of the crank shaft the forks are raised, thrown over into the manure, and then drawn out with the load sticking to them. This load falls on to the conical screen, M, and is thereby evenly spread over the ground.

Fig. 1

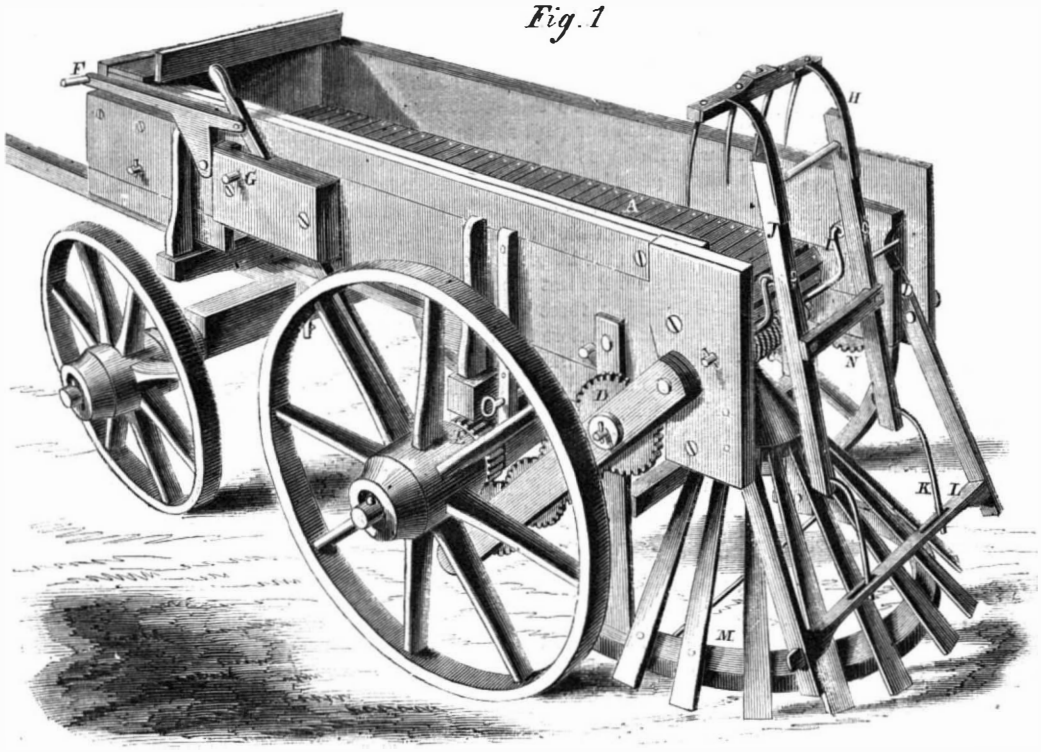
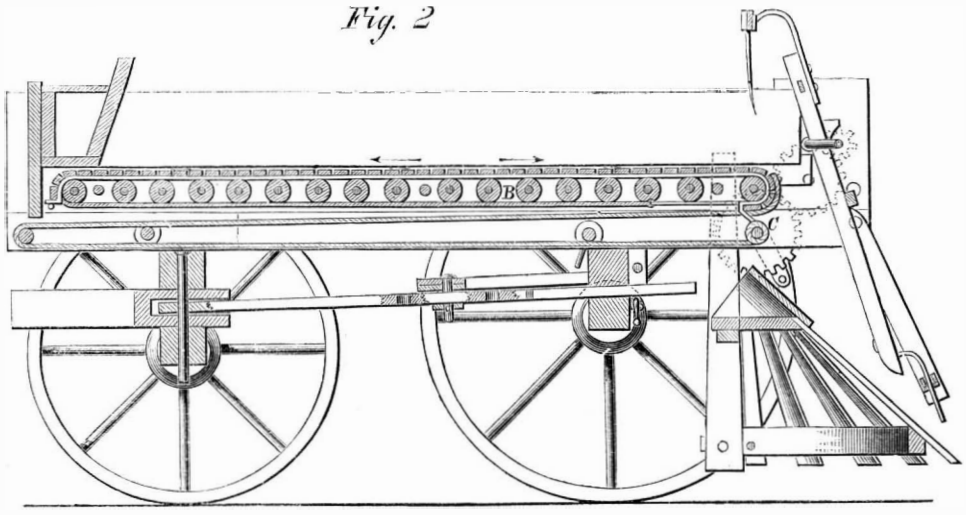


Fig. 2



The apron or loose bottom of the wagon does not rotate or traverse entirely around the body, but it goes far enough to carry the whole load out to be acted upon by the forks. At the opposite side of the wagon there is a system of gearing, N, to be worked by hand; this enables the attendant to draw the bottom back to its place again so that another load may be placed within the wagon. There are also a series of friction rollers set in the wagon frame for the ends of the slats, constituting the bottom, to bear against; these materially lessen the friction of the parts one against the other, which, in passing over undulating ground, would be great. By the use of this machine a great deal that is unpleasant in the performance of this necessary duty is avoided, and after the load is once placed in the wagon the farmer may ride over the field and not come in contact with the manure in any way, all handling, whether by forks or otherwise, being dispensed with.

The machine as thus arranged, forms a very efficient and convenient one for the purpose. It was invented by James H. Stevens, of East Durham, N. Y., and a patent is now pending on it through the Scientific American Patent Agency. For further information respecting it address the inventor at that place.

STEVENS'S MANURE-SPREADER.

An Ounce Weight and a Tun Weight.

An ounce weight and a tun weight of iron will fall down a pit with equal speed and in equal time. Until about 300 years ago, all the learned men in the world disbelieved and denied it. Galileo, an Italian, taught the contrary to the popular belief. The University of Pisa challenged him to the proof. The leaning tower of that city was just the place for such an experiment. Two balls were obtained and weighed, and one was found to be exactly double the weight of the other. Both were taken to the top. All Pisa looked on, and crowds of dignitaries were confident that young Galileo, then obscure and despised, but honored and immortalized now, would be proved to be in error. The two balls were dropped at the same instant. Old theory, and all the world, said that the large ball, being twice as heavy as the less, must come down in half the time. All eyes watched, and, lo! all eyes beheld them strike the earth at the same instant. Men then disbelieved their eyes, and repeated the experiment many times, but each time with the same result. The little ball was big enough to destroy a theory 2,000 years old; and had it been little as a pea, it would have destroyed it just as well, or even more quickly.

But how was this? Did not the earth draw down the large ball, which was double the weight of the smaller, with double force? Did not the double weight indicate the double force? Yes, truly; but in drawing down the large ball there was a double force of resistence to be overcome, and as the two forces acted in a given proportion on the large ball, and in the same proportion on the less, the velocity of the two was equal, though in bulk they were unequal. Let us suppose there to be two wagons, one with a load of five tuns, and the other ten tuns, and that the unequal loads are drawn by an equal horse-power—should not their speed be equal, though their weight is unequal? No. There must be double horse-power to draw the double weight, to obtain equal speed. Let a ten-pound weight and a one-pound weight fall to the earth at the same time, and the earth must draw down the heavier weight with ten times greater force than the other that they may have equal speed, and it does so. A tun weight of iron and an ounce weight, leaving the top of a pit at the same instant, would, therefore, at the same instant fall to the bottom.

GREAT activity prevails in all our navy-yards.

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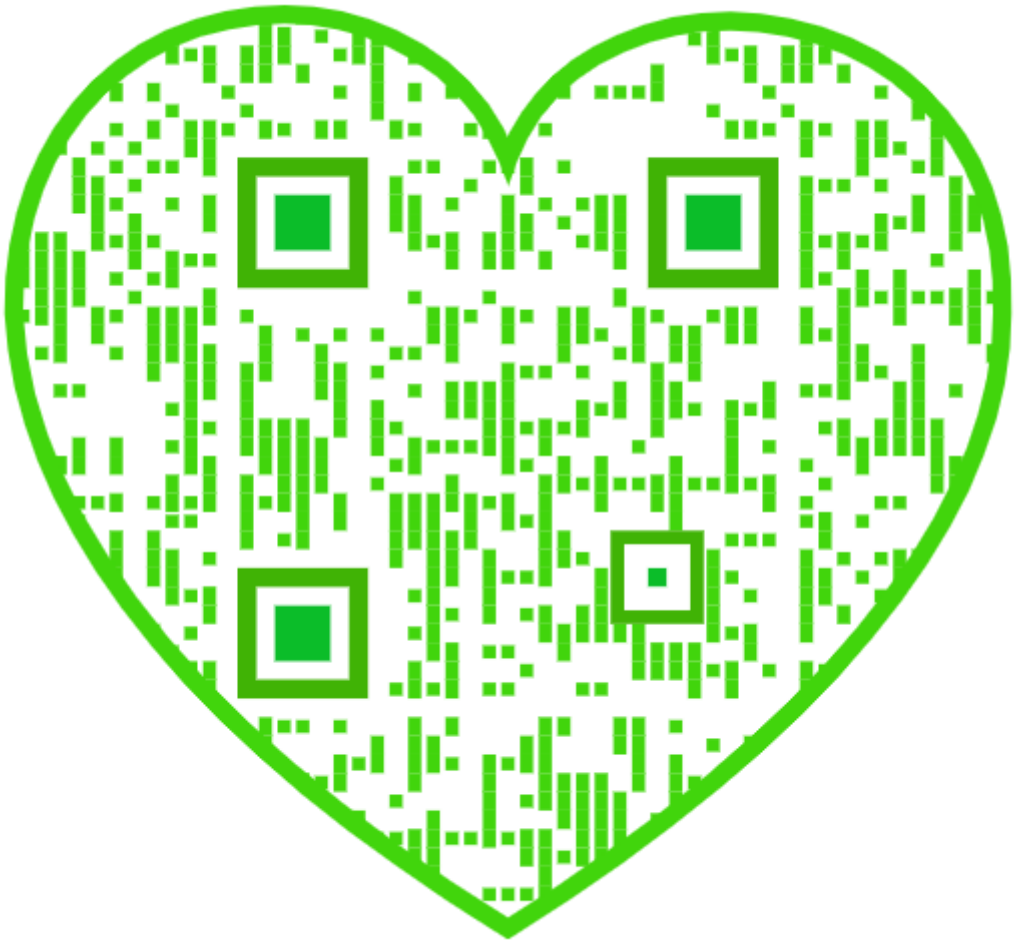

IRON-CLADS AT HOME AND ABROAD.

The appended article recently appeared in the N. Y. *Daily Times*; our readers will find it worthy of their attention:—

"We have previously mentioned the increase of the navy at the close of the year 1861, but we omitted to observe that it was as early as in the beginning of August of that year that Congress provided by a special act for the construction of iron or steel-clad steamships or steam-batteries, directing the Secretary of the Navy to appoint a board of naval officers to investigate the plans and specifications submitted for these objects. The board approached the performance of their duty with hesitation and diffidence, for in this country there was no experience, and but scanty knowledge in this branch of naval architecture. The plans handed in were so various, and in many respects so entirely dissimilar, that the board may justly congratulate itself upon the success attending its first selections.

"At the time of which we are speaking the French and English plated vessels carried only broadside guns, and were protected by armor-plating of four and a half inches, placed against a more or less thick backing of wood—the hull being in some cases of wood, and in others of iron. Of the three vessels selected by the board, two were to be built of wood and iron, on the European plan. One of these two proved to be a failure, but the other, known as the *New Ironsides*, is as efficient a vessel for her size as any seagoing iron-clad afloat. Besides following the example set us abroad, the United States originated an entirely new pattern of iron-clad vessels, called from the first one of them the 'Monitor' class, which have proved practically invulnerable, and have performed, and promise to continue to perform, the most valuable service. At the close of the year 1862, the Navy Department was in possession of fifty-two iron-clad vessels (including those in the Western waters), 28 of which were on the sea-board. At this period the whole number of vessels of the navy amounted to 427 of all descriptions, which was an increase of 221 over the number given for the previous year. If we carry these estimates still further forward, we shall find that the number of vessels at the close of the year 1863 was 558, showing a still further increase of 161. Of these 46 are iron-clad steamers intended for coast service, some of them being still under construction.

"In the event of foreign aggression, these iron-clad vessels constitute the force upon which we are to depend in a considerable measure, for the protection of our coast. Those of them belonging to the monitor class have been subjected to actual trial in war, and have proved to possess a power of endurance never before imagined. We may look forward with confidence to the result of a conflict between these vessels and vessels like the *Achilles* or *Magenta*. Upon this subject the recent engagement between the monitor *Weehawken* and the rebel armored steamer *Atlanta* affords very satisfactory evidence. The *Atlanta* resembles the French and English plated vessels in her style of construction and armament, though much less strong; but the extreme facility with which she was placed *hors du combat* justifies the expectation that neither the *Warrior* nor even the monster *Bellerophon* would prove an overmatch for the largest monitors. The truth is, that a single shot, and that the first one, decided the fate of the *Atlanta*; forty officers and men were wounded or stunned by its effect, and if no other shot had been fired that day, the victory would have been as complete as it was acknowledged to be when the remaining four shots had been delivered. If the first attack of the monitors upon Charleston was a sufficient proof of the enduring qualities of these vessels, the easy conquest of the *Atlanta* was an equally satisfactory evidence in favor of our new ordnance. The careful observer will be struck with this as a much more important general result than any that followed from the famous engagement between the *Monitor* and the *Merrimac*. The latter was repulsed with signal success, but we never had the means of learning the injury she sustained; we know, however, that the former came out of the action in the same condition that she went into it. The English have discovered that four and a half inches is not a sufficient thickness of plating, and they have resorted, in the case of the *Minotaur*, to five and a half inches, and in the case of the *Bellerophon* to six inches. The last two ships are as we understand, the only ones hitherto built that are wholly protected above and to some distance below the water line. They are undoubtedly gigantic men-of-war, fitted to control the seas over which they range. We are far from wishing to disparage their power and their value. On the contrary, we would cite them as examples for imitation; and urge upon Congress the imperative necessity of building similar vessels ourselves, without which we shall not be in a suitable condition to drive a blockading force from our ports, though we may prevent that force from entering them. There is no doubt that the pleasure of entering the harbor of New York or Boston in these heavy iron-clad vessels, running by the forts with safety, and laying the cities under contribution, is a scheme of aggrandizement which, though much more difficult to execute, has as often been contemplated as the act of sweeping the commerce of the United States from the ocean by piratical cruisers. It is some satisfaction to believe that we shall prove to be, with a little warning, sufficiently on our guard, and well enough armed to prevent this outrage. But this is not enough. We must be prepared to meet our foes on the threshold, and beat them backward home.

"We ought to be prepared to make such an undertaking so hazardous that it will not be hastily attempted; and there is no doubt that this is in our power. Recent experiments have afforded the most conclusive proof that not even the *Bellerophon*, with all her magnificent proportions, could stand before our heavy ordnance. To this ordnance we have owed a great deal, and our past successes enable us to look forward with hope for the future. The change which has taken place in our navy ordnance has been commensurate with the changes in the vessels. At the commencement of 1861, the eight, nine, ten and eleven inch guns were the largest in the navy; and of these, it appears from the last report of the chief of the Bureau of Ordnance, there were 958 in the possession of the Government before the breaking out of the war. But a considerable number of nine and eleven-inch guns fell into the hands of the insurgents at Norfolk and Pensacola, and had to be immediately replaced. To these were added for the first time, the newly invented thirteen-inch mortar, the new Parrott rifled guns, from the 20-pounder to the 150-pounder, the new fifteen-inch smooth-bore gun, and the Dahlgren 20-pounder rifled gun. The whole number of guns, of all calibers, made between March, 1861, and November, 1863, amounts to 2,811, and it is probable that the end of the current year will witness a further addition of 700 guns of the largest size. This change in the armament of the navy, by the addition of rifled guns and guns of the heaviest caliber, is exemplified in the composition of the batteries of the vessels of different rates. Besides the Dahlgren nine and eleven-inch guns, the battery contains one 150-pounder and four 100-pounders rifled. The weight of metal must vary, independently of the rating, according to the size of the vessel. But vessels of the lowest rate carry rifled guns, while vessels of the monitor class carry one fifteen-inch gun.

"For the manufacture of all these heavy cannon the Department was obliged, at first, to depend on the well known foundries at South Boston, Fort Pitt, and West Point. Several other establishments have since added their co-operation, at Portland, Boston, Providence and Reading. This rapid development of the mechanical ingenuity and the resources of the country has already placed us on such a footing as to relieve our minds in a great measure from previous anxieties on this head."

Riveted Joints in Wrought Iron.

One of the most important operations in engineering is the making of joints in wrought iron, or joining two or more pieces of wrought iron together. It is equally important to have a good and proper joint in a wrought iron girder as in a wrought iron steam boiler. Many lives and valuable property may depend upon the quality of the joint in either case.

In a wrought iron girder whose length is too great to have the plates, bars, or angle irons in one piece, extending from end to end, except by welding, which is generally too expensive, and not always safe until each weld has been tested, it is necessary to connect the two or more pieces of metal in such a manner that the whole of any strain on any one plate or bar shall be taken through or conducted to the next plate or bar with as much safety as if the two pieces of metal were one. This conduction of strain from one bar to another ought always to be done with the least possible amount of metal in the joint, for self-evident reasons. Any excess of metal in the joints of course adds to the weight of the girder, and not only adds the excess in the joints, but also increases the sectional area of the girder throughout, so that the girder must be calculated to carry that excess of dead weight, and is therefore much heavier.

The quantity of wrought iron now used in various constructions which are "built up" of separate plates and bars of wrought iron is so great that, with a good and proper arrangement of joints, a large amount of metal would be saved. It can easily be imagined that any excess of metal in the construction of a girder must diminish the span that it would otherwise carry itself over with safety.

In wrought iron construction the joints should be as few as possible. The plates and bars should be made of the greatest possible length, but not to exceed such a size and weight as to increase the cost of rolling them. The joints can be made by placing the various parts so that one piece shall lap over another, and the two be riveted together. In this case the rivets will be in "single shear," that is, in pulling the two pieces of iron apart, each rivet will be sheared or cut through, only once, whilst if the pieces of metal butt against each other and have a joint plate or bar on each side and riveted, the rivets will be in "double shear," that is, each rivet must be sheared or cut through, in two places before the joint will break. Therefore, this kind of joint requires only half the number of rivets that there are in the lap joint. It is this butt joint which is generally made in girder work, for the very evident reason that, although two joint strips or plates are required —one on each side of the abutting plates—only half the number of rivets are necessary to make to make an equally strong joint as the "lap joint." Where several plates or bars have to be joined at the same place, as is sometimes the case in the flanges of girders when composed of several thicknesses, where they all butt in the same plane, the joint plates of necessity extend some distance on either side of the joints, so as to have room for the proper number of rivets. In this case the rivets should be placed as near to each other as possible without injuring the strength of the plates. Otherwise, if they are too far apart, the first row of rivets will have a much greater strain than the second row, the second row a greater strain than the third, and so on to the last row, which will have the least amount of strain. In fact, this will be the case no matter how near each row is to the other, but the difference will not be so great. It is the elasticity of the metal which causes this difference of strain on the rivets. A joint plate might be so long that the first row of rivets would actually be sheared before the last row had any strain upon them worth speaking of. Therefore, for two reasons, the joint plates should be as short as possible—first, to get as nearly as possible an equal strain on all the rivets, and secondly, to have the least amount of weight in them.

The rivets should in all cases be so arranged that the holes, if drilled, would not decrease the strength of the bars, or useful sectional area, more than by one hole. And the sectional area of the shearing parts of the rivets on each side of the joint should never be less than the sectional area, *minus* the rivet holes, of the bar or plate to be joined. It has been proved by experiment that the ultimate resistance to shearing is proportional to the sectional area of the bar torn asunder, and that the ultimate resistance of any bar to a shearing strain is very nearly the same as the ultimate resistance of the samebar to a tensile strain. Therefore, if the sectional area of the shearing parts of the rivets on each side of the joint is equal to the useful sectional area of each bar to be joined, there will be the same strength in the rivets as in the joined plates or bars. In most cases it is advisible to have some excess in the sectional area of the rivets, to allow for bad workmanship. Sometimes the rivet holes in several pieces of metal are not fair with each other, and when the rivet is driven in hot, it accommodates itself to the irregular hole, and forms a bad rivet, having lost a portion of its shearing area. A still greater excess should be allowed in the case of rivets that pass through a greater num-

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ber of pieces, for the holes are more likely to be irregular. The excess to be allowed depends very much upon the quality of the workmanship in the construction. If the holes are carefully drilled the excess to be allowed may be much less than when the holes are punched.

In addition to the shearing strength of the rivets, some strength may be calculated upon from the friction that is produced by the riveting and cooling of the rivets; this additional strength can only be calculated upon as an addition, when it is quite certain that the rivet holes are completely filled by the rivets.

Experiments show that a three-quarter inch rivet properly riveted in three plates or bars, the center one having a slotted hole, will take five tuns to overcome the friction of the heads of the rivet, and make the center plate slip between the other two, and the friction given by a $\frac{7}{8}$-inch rivet will not be overcome with less than seven tuns. This extra force from friction is no addition to the shearing strength of the rivets, unless the rivet holes are well filled up. There is no doubt this friction adds much to the rigidity of built wrought-iron girders, and has something to do with the deflection being no more than if all the joints were welded. Good riveting will bring all the plates into close contact, and besides adding to the stiffness of the work by friction, it prevents anything more than a superficial coating of oxide between the faces riveted together.

No doubt machine riveting is the best for giving the greatest friction, and filling the rivet holes most perfectly; and it certainly injures the rivets less than the succession of blows given by hand riveting. In hand riveting many of the blows are given when the rivet is comparatively cold, and have, therefore, a tendency to destroy the quality of the iron in the head; and, again, hand blows cannot force the metal into the body of the rivet hole in any way to be compared to machine riveting. A machine riveted boiler is generally tighter under pressure than a hand riveted boiler, showing the plates are in closer contact, and better able to resist corrosion by being riveted with machinery.—*Mechanics' Magazine.*

ALEXANDRE VATTEMARE.

At the meeting of the Farmers' Club, held on the 26th of April, the President, N. C. Ely, Esq., made a formal announcement of the death of Alexandre Vattemare, an honorary member of the American Institute, and formerly a frequent attendant of the meetings of the Farmers' Club. The announcement was responded to by—

Dr. David Holton :—Mr. President, I have met with Monsieur Vattemare, as associated in labor with the late Josiah Holbrook. Forty years ago Mr. Holbrook commenced in Boston his labor of organizing a system of exchanging minerals and other specimens of natural history between different schools. The pupils of each district collected specimens prevalent in their district, and the duplicates of these were exchanged for the duplicates of other districts, and thus large cabinets were cheaply and easily formed.

Monsieur Vattemare, at that time a distinguished ventriloquist, happened to meet Mr. Holbrook in this city, and he conceived that the system of exchanges which Mr. Holbrook had successfully established between districts, towns, counties, and States, might be extended to nations, kingdoms, and empires. To this great labor Monsieur Vattemare devoted the remaining years of his life.

On the Fourth of July, 1855, I was in Paris, and witnessed the opening of the hall dedicated to the reception of the books from the United States in the exchanges organized by Monsieur Vattemare. The rooms were quite spacious, and were piled with the best American works, a present from the publishers. The Emperor had directed alcoves to be set apart for them in the Hotel de Ville, where they might be accessible to those desirous of consulting them. A discourse was pronounced by Mr. Guizot, highly complimentary to American literature and to the labors of Monsieur Vattemare.

At that time it was my lot to announce to Monsieur Vattemare the death of Mr. Holbrook, his fellow laborer. Mr. Holbrook was gathering mineralogical specimens with his hammer and basket, near Lynchburgh, in Virginia, when he fell down the mountain, and his body was found in the river at its base.

In making the exchanges organized by Mr. Holbrook, a small cabinet of minerals was forwarded to each member of the New York Legislature; and this was a year or two before the vote inaugurating a geological survey of the State. Perhaps the possession of these curious specimens may have had some influence on that vote, which has resulted in so much honor to this State among the men of science throughout the world.

Mr. Robinson :—It was the propelling power that carried the measure through. There is no doubt of it.

Patent Machinery for punching Plates.

M. H. Lishman, of Stockton-on-Tees, England, obtained a patent on the 14th of August, 1863, for a machine which is thus described:—

"In punching holes in metal plates for ships boilers and other purposes, it has hitherto been usual to mark on the plates by hand all the spots where holes are to be punched. In punching plates for ships, a great difficulty also exists, from their curved shape necessitating the punching of the holes in the various plates at different distances apart. Now, this invention consists in punching holes in manner and by the machinery hereafter described. Upon standards in front of the machine, the patentee fits a table free to travel to and fro, upon which the plate to be punched is laid; the plate must previously be marked at the two spots between which holes are to be punched, for instance, for the holes for the rivets which secure a plate to the ribs of a ship. Above the plate, and bolted to or forming part of the punching machine, is a bed-plate having fixed thereto a frame or apparatus by which the space between the two marked spots is divided, as hereafter described, into as many equal distances as there are holes to be punched. This frame or apparatus is composed of two longitudinal bars, free to move upon, as fixed centres, near one end thereof. The shorter arms of these longitudinal bars are connected by a slotted transverse bar placed at a given distance, say 3 inches more or less, from the fixed centres, the longer arms are divided into spaces of 3 inches or each equal to the given distance just mentioned, and at each division there are holes for securing another slotted movable transverse bar or a wire. The longitudinal bars are drawn out of a straight link or into a position where they form an angle with the line of holes to be punched, when it is necessary to reduce the distance between the holes. When the punching machine is set in motion, it punches a hole in the plate where marked; the table is then made to travel by suitable mechanism, until the hole comes underneath a pin, which drops in the hole, throws the mechanism out of gear, and stops the table, when the punch descends to punch another hole, after which the pin again rises, the same operations are repeated until all the holes are punched, the pin always falling into the hole last punched. Instead of fitting the dividing or regulating apparatus, above described, to a punching machine, it may, slightly modified, be employed simply for marking the spots where holes are to be punched, and the punching may then be performed by any ordinary method."

The Owners of a Boiler convicted of Manslaughter.

The Birmingham correspondent of the London *Engineer* writes :—

"The inquest on the bodies of the twelve men and boys killed by the explosion of a boiler at the Hall-End Iron-works (near West Bromwich) of Messrs. Thomas and W. E. Johnson, has resulted in a verdict of manslaughter, as well against those gentlemen as against their engine-tender, William Bagnall. The coroner (Mr. Hooper) in sending the case to the jury, said that the scientific evidence went to show that the explosion had taken place from over-pressure, and not from want of water; and the other evidence seemed to point to the fact that, at the time when the explosion took place, William Bagnall was sober, although he had been drunk on the previous day. It was his duty to tell them that, if they believed that the defective state of the boiler was brought under the notice of Thomas Johnson and W. E. Johnson, and that they had taken no practical notice of the information, it would be their painful duty to return a verdict of manslaughter against those persons; but if they were not clearly satisfied, they must give them the benefit of the doubt. The coroner concluded by remarking on the high character of the scientific evidence adduced. After the jury had deliberated for about two hours and a quarter, the public and parties interested were readmitted into the court, when the coroner said that the jury, having carefully considered the evidence before them, returned a verdict of manslaughter against Thomas Johnson, sen., the proprietor of the Hall-End Works, and his son, William Edmund Johnson; and also against the chief engineer, William Bagnall, *alias* Bagley. That was the verdict of seventeen out of the nineteen jurors as regarded Messrs. Johnson, and the whole of them as respected Bagnall, the engineer. As regarded the verdict, he himself had arrived at the same conclusion, and he believed it to be a strictly honest, just, and impartial decision. The Messrs. Johnson and William Bagnall were admitted to bail on two sureties of £100 and themselves in £200. The inquiry lasted until half-past one o'clock."

Genius and Cooking.

A "cook and housekeeper," named Katy Liddle, of No. 7 Comelybank, Edinburgh, has lately filed the following provisional specification in the Patent Office. The Commissioners of Patents have, however, refused provisional protection. Katy says:—"I get a tinsmith or other competent person to make for me, of any suitable material, an egg or saucepan constructed with a second bottom placed on a framing inside, two or three inches above the bottom of the pan, in which second bottom are made one or more holes, according to the size of the pan desired, to receive the bottom of as many small tea-cups placed in the holes made large enough to allow the cups to be immersed in the boiling water up to the middle of the cup. I place this pan on the fire, with water sufficient to cover the upper bottom, and let it boil; I have ready the number of eggs required to be cooked, with a small tea-cup for each egg. This tea-cup I dip in boiling water but without leaving any or very little of the boiling water in it, and I then break the egg in the usual way and place it in the tea-cup, and I do the same with all the eggs I have to cook. The tea-cups with the eggs in them are then placed in the pan in the holes made for them in the second bottom, as above mentioned. I carefully watch to see the egg done to the precise degree of doing it according to the taste of my master, which generally takes not quite so much time as does the ordinary method of boiling an egg in the shell. My master thinks this a very superior method of cooking an egg. He says that it very much improves the flavor as compared with the ordinary method of boiling an egg in the shell; it is also so nice and clean-looking, and you can also by it always and at once detect an unsound or imperfect egg. As compared with the usual method of poaching an egg, every one admits that my method is a decided improvement. My master is at pains to show it off to any friend or friends who may be visiting him, whether it be at breakfast, or at dinner, or at supper, by having an egg cooked for each friend after the manner I have described above. He likewise says that it makes the egg so light and easy of digestion that he thinks a man might with ease eat half-a-dozen at a meal without any injurious consequences."

Great Coal-oil Case.

Our English exchanges contain full reports of the important case of Young *vs.* Fernie, which involves the originality of James Young's patent for distilling paraffine or kerosene oils from Boghead and other coals. A large amount of evidence has been taken on both sides of the case, and numbers of chemists and experts have testified—some on the side of Young and others on that of his opponent. What renders this case important is that some of the most widely known chemists express the conviction that Young's invention was really novel, while others, equally eminent, declare it to have no novelty whatever, and that his process had been used many years before his patent was granted. The decision of the court in this case will be regarded with much interest, for business operations of great magnitude are involved in the result. The diversity of the scientific witnesses affords a commentary by no means pleasing, and suggests the unpleasant reflection that individual opinions frequently override what science teaches as fact, and the followers of science often ignore the instructions which they should have thoroughly digested and appropriated, and descend to expressions of opinion outside their sphere.

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THE MOST IMPORTANT AMERICAN DISCOVERIES AND INVENTIONS.

No. 6.

THE PLANING MACHINE.

Woodworth.---1826.

None but a carpenter who has spent weeks of hard work in smoothing the floors of a building with a jack-plane can appreciate the boon conferred upon mankind by Woodworth's invention of the planing machine.

This great invention was made by William Woodworth, of Hudson, N. Y., during the winter of 1826–7. The idea of substituting machinery for hand labor in dressing lumber was conceived by Mr. Woodworth in early life, but he had not sufficient funds to construct a working model, nor indeed sufficient leisure to mature the plan in his own mind. In December, 1826, he was disabled for work by having his hand injured in the machinery of a block manufactory, and during the leisure resulting from this he brought his long-contemplated invention to maturity. He finished his drawings, but several months elapsed before he was able to make arrangements for constructing a working model. At length Mr. James Strong, of Hudson, agreed to carry the matter through for one-half of the invention. Steps were taken to secure a patent, and the construction of a working model was commenced. The machine was completed sufficient for trial in August, 1828, and after being tried in Hudson it was taken to the city of New York, where it was subjected to a series of experiments, and perfected. The patent was granted Dec. 27th, 1828.

This machine, like Whitney's cotton-gin and most other of those great inventions which are the product of a single mind, came complete from the head of the inventor. No material change has ever been made in the important parts of the mechanism, and the hundreds of machines that are now roaring from morning till night in their hard labor, are of essentially the same construction as the one first made from Woodworth's drawings.

A number of sharp knives are secured to the periphery of a rapidly-revolving wheel, beneath which the board is passed from end to end; the cutters in their revolutions taking off chips so short as to leave the surface perfectly smooth. When matched-boards are desired for floors or ceilings, a tongue is formed upon one edge and a corresponding groove upon the other by cutters of the proper form secured to the peripheries of disks at the edges of the board.

The patent for this invention was twice extended, first by the Commissioner of Patents, and second by Act of Congress. The right to the second extension was sold by the heirs of the inventor for $50,000. It is estimated that the saving to the country by the machines now in operation is not less than $6,000,000 a-year.

THOMSON'S COMBINED BAROMETER AND THERMOMETER.

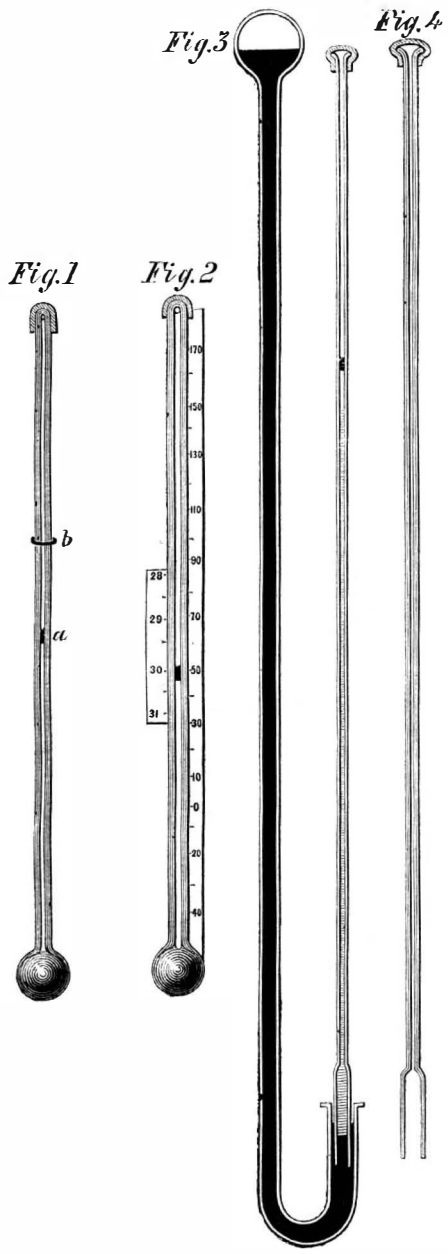
A BAROMETER ON A NEW PRINCIPLE.

It is roughly estimated that the atmosphere extends from the surface of the earth upward about 45 miles, but there are no means of ascertaining its extent with any degree of accuracy. Notwithstanding, however, the fact that the depth of the atmosphere is unknown, the weight of a column of any given size—a square inch for example—and extending in length from the surface of the earth to the upper limits of the air, whatever that hight may be, can be determined with the utmost precision.

If a tube, closed at one end, is exhausted of air, and the open end is immersed in any liquid, the weight of the air resting upon the surface of the liquid outside will force the liquid into the tube upward until this interior column is just equal in weight to a column of air of the same size, and reaching upward as far as the atmosphere extends. A tube thus prepared and furnished with a suitable scale is called a barometer; from the Greek *baros*, weight, and *metron*, a measure.

It is found by experiment that the weight of the atmosphere will sustain a column of water about 34 feet in hight, or a column of mercury about 30 inches in hight; mercury being 13½ times heavier than water. As a column of mercury an inch square and 30 inches long weighs about 15 lbs., it follows that a column of air an inch square and reaching from the surface of the earth upward to the boundaries of the atmosphere must also weigh 15 lbs.

As the air is constantly moving about in currents, and as the watery vapor which it holds is constantly varying in quantity, the weight of the atmospheric column in any place is constantly changing. These changes are of course indicated by corresponding changes in the hight of the liquid column within the barometer tube. In this latitude, and at the level of the sea, the weight of the atmosphere sustains a column of mercury ranging from 27¾ to 31 inches in hight.



Mercury being the heaviest liquid known, barometers in which it is used are shorter and more portable than those made with other liquids; but even the mercury barometer is not very portable, as it must be at least 3 feet long, and, unless precautions are adopted, there is danger of spilling the mercury from the open cup whenever the instrument is inclined. Many efforts have consequently been made to devise a more portable instrument, and we here present an illustration of one which is, so far as we are aware, entirely novel in principle, and which it seems to us may possibly receive a more extensive application than is proposed by the modest inventor—a very rare circumstance.

Nothing can be more simple than the instrument here illustrated. It is formed of a tube, Fig. 1, in the cut, similar to the tube of a thermometer, open at the upper end, with a short column of mercury, *a*, which confines the air in the tube below it and in the bulb. The weight of the atmosphere presses upon the upper side of this short mercury column, while the elastic force of the confined air presses upon its lower side, and, as it slides freely up and down, it always occupies the position where these two forces are balanced. The pressure of the confined air would be constant if its temperature were constant, and in that case the position of the mercury would indicate correctly the weight of the atmospheric column. The inventor proposes no plan for keeping the confined air always at the same temperature, but he accomplishes practically the same result by always bringing it to a certain fixed temperature at the time of making the observation. This he does by simply placing the bulb in his mouth, when the air is brought to the constant temperature of the human body—98° Fah.

As changes in the weather are indicated, not by the actual weight of the atmospheric column, but by changes in that weight, this instrument is designed especially to indicate those changes, and therefore to serve as an exceedingly simple, cheap, and portable weather glass. To this end an elastic steel clasp or ring, *b*, is slipped upon the tube, and when an observation is taken, the ring is brought to the same part of the tube as the mercury; then when the next observation is taken, the position of the mercury, above or below the ring, will indicate an increase or diminution in the weight of the atmospheric column. If the mercury is above the ring the air has become lighter and rain may be expected, if lower, the chances are in favor of fair weather.

As the air in the bulb expands and contracts with changes of temperature, moving the mercury up and down, it is plain that by attaching a properly graduated scale, as shown in Fig. 2, the instrument, when the bulb is not in the observer's mouth, will indicate correctly the temperature of the air, and will thus become a thermometer as well as barometer.

The inventor suggests that where persons have deep wells with water of constant and known temperature, the bulb may be immersed in freshly drawn water, instead of being placed in the mouth of the observer, whenever the weight of the atmospheric column is to be measured.

Fig. 3 illustrates an improvement designed by the same inventor for multiplying the indications of the mercury barometer. A tube, Fig. 4, open at both ends, with the lower end enlarged, and partly filled with colored alcohol, has its lower end inserted in the open cistern of mercury. It will be seen that a rise or fall of the mercury in the cistern will be accompanied by a corresponding rise or fall in the surface of the alcohol, as much greater in proportion as the enlarged part of the tube is greater than the capillary bore.

A patent for these improvements was granted to John Thomson, of Wayne, Dupage county, Ill.; who may be addressed for further information in relation to them.

The Mississippi Valley Sanitary Fair.

This fair will be opened at St. Louis, on the 17th of May; and the Committee make an appeal for donations in behalf of said fair. Large sums of money have been contributed throughout the Eastern States to the funds of the Sanitary Commission, which will be applied to relieve the wants and to make comfortable the soldiers of our army in the tent, the hospital, and upon the field. The soldiers of our army—East and West—are alike subjects of the proper care of the Government and the people; and no needed comfort should be withheld from them. Something more, therefore, is required to supply all the necessities that will soon exist in the South-western army; and the St. Louis fair is designed to promote this object. We trust, therefore, that there will be a liberal response to the appeal of the Committee. They ask for contributions in money, merchandise, articles of curiosity, relics, books, pictures, agricultural and mechanical implements, live stock, products of the farm dairy—indeed anything that will attract attention or command a sale.

Contributions in money may be sent to John P. Yelverton, President of the Bank of North America, this city. Goods and packages should be directed to J. E. Yeatman, St. Louis, Mo., with the name of the donor; and two bills, giving value of articles, may be sent to Mr. Yeatman or to Messrs. Pratt & Fox, 20 Cliff street, this city.

PATENT LANTERN.—On page 269 of the current volume we published the claim of F. W. Woodward's patent lantern. It should read G. W. Woodward, whose address in this city is No. 286 Greenwich street.

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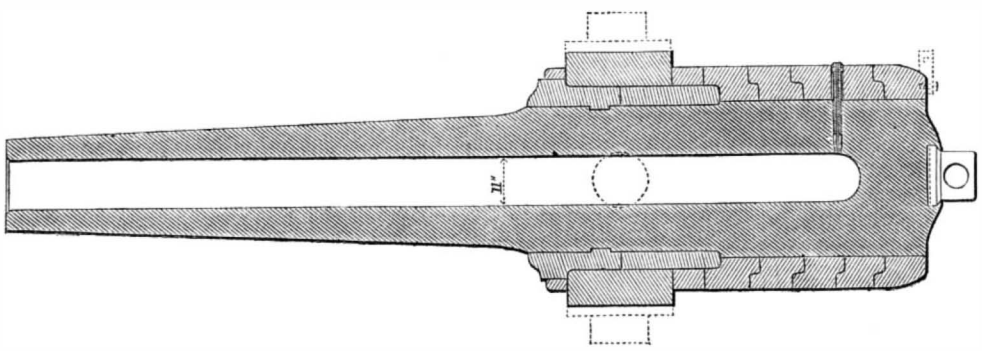
CAST-STEEL ORDNANCE.

We are enabled to lay before our readers a correct representation, made from a working drawing, of one of Krupp's cast-steel guns. These weapons have become celebrated for their strength and endurance; and the translation which we present, extracted from the *Invalid Russe*, organ of the Russian Government, will serve to show the estimation they are held in by that Power. The Russian Government have ordered of Mr. Krupp 220 guns of 8-inch, 9-inch, and 11-inch bore, all rifled muzzle-loaders, together with a number of steel shot and adjusting cylinders for loading. The value of the contract exceeds 4,000,000 thalers, or about $3,000,000—the gun to be delivered at the works in Essen. The 11-inch gun will weigh about 27½ tuns, and costs $30,000 (40,000 Prussian thalers). The extreme length is 17 feet 2 inches; the diameter at the reinforce is 47½ inches. The whole gun is of cast-steel, and the barrel alone will require an ingot of forty tuns in weight, upon which cast-steel rings of a peculiar form are shrunk, as will be seen by the diagram herewith annexed:—

THE OFFICIAL REPORT CONTAINED IN THE "INVALID RUSSE," No. 271, OF DECEMBER 28, 1863, UPON THE TRIALS WITH A 9-INCH CAST-STEEL EXPERIMENTAL GUN :—

"It has been found necessary, since the introduction of iron-cased vessels, to use guns of the greatest possible caliber in order to destroy the iron coating, and also to do this at the highest practicable ranges. To attain this desired object it has been rendered essential to produce guns from a metal possessing a high tensile strength and capability of resisting the enormous strain of large charges of powder. From experience it has been proved that cast-steel is the best metal, and far superior to all others hitherto applied to gunnery, as it combines with strength the important element of toughness; consequently our Government has ordered for the armament of our iron-cased vessels, and sea-coast defenses, a number of 8-inch and 9-inch guns from the well-known and justly renowned works of Mr. Fried. Krupp, of Essen, Rhenish Prussia—the only establishment capable of executing cast-steel guns of such large dimensions.



"All breech-loading guns tried up to the present time have not possessed sufficient strength to resist the forces they are exposed to, as the soft coating of the heavy shells and shot used with such guns has frequently been stripped off; and to obviate this objection our Government has ordered heavy guns to be loaded from the muzzle. To ascertain by experience which class of rifling might be most suitable, and also the kind of shell best adapted for such heavy guns, and moreover to test the effect upon iron plates, a 9-inch gun was ordered from Mr. Krupp to practically solve these questions. It has been proposed by Sir Wm. Armstrong, in order to obtain the greatest possible accuracy for muzzle-loading rifled guns, to use a plan of rifling known as the "shunt" system, and which has proved in practice to be very good, as the shell is compelled to leave the muzzle of the gun without there being any space between the diameter of the bore of the gun in the rifle grooves, and the diameter of the shell as measured across the projecting studs or wings. This system of rifling possesses not only the advantage and accuracy of flight, but also admits a longer durability of the gun, as it is not necessary to cut the rifle grooves obliquely. The pitch of the rifling is also uniform. The strain upon the soft coating of the wings of the shot is also less than in grooves cut obliquely. This Armstrong system of rifling has also been satisfactorily introduced in our brass guns and also in guns of cast iron, for we have not had to report the bursting of guns rifled upon this system; which, however, has happened with guns rifled upon other plans. A 12-pounder cast-steel gun was supplied from the works of Messrs. Krase, Michailow, and rifled upon the Armstrong shunt-principle, having one turn in the length of the bore. This gun was fired with a comparatively heavy shot and with satisfactory accuracy during 800 rounds. The 9-inch cast-steel experimental gun, supplied by Mr. Krupp, was rifled upon the same system, the grooves having likewise the same twist as the 12-pounder. The shot weighed 300 pounds, and the gun was fired with the extraordinary charge of 50 pounds of powder. The guiding projection, or wings on the shot, were made of zinc. The effect of this gun upon armor plates supplied from the best English manufacturer (Brown, of Sheffield), was all that could be desired, for even cast iron shots pierced plates of 4½ inches thick, and one or two rounds were sufficient to destroy the plate. A Lancaster plate of 5½ inches thick was pierced at the first round by a steel-shot. Two 4½-inch plates, laid one upon the other and representing a thickness of 9 inches of metal, were utterly destroyed by five shots from this 9-inch gun. Upon inspecting the shot after being used it was observed that on some of them the projecting studs or wings were cut off, and it was therefore determined to make them of a harder metal than zinc, but in the meantime not to interrupt the experiments against the iron plates, it was resolved to continue with the same shots. At the sixty-sixth round the gun burst. Near the place where the shot first receives motion, the metal between the grooves was partially flattened down and pressed into the grooves, but nearer to the trunnions the metal between the grooves was pressed quite flat. At the muzzle end of the bore the grooves were quite sound and uninjured. On examining the shot that caused this mishap, it was discovered that nearly all the projecting studs were cut off, and the axis of the shot was much bent. There were also three projecting lumps on the front part of the shot. All this proves that the bursting of the gun was caused through the misleading of the shot which left the rifling and became wedged in the bore of the gun; it would be impracticable to make a gun capable of resisting this jamming-in of the shot, and the accident demonstrated the enormous power exerted by the powder.

The fractures of the metal were quite sound, and showed a most excellent and superior quality of the steel with the highest possible tenacity, softness, and homogeneity. A piece of steel from this gun was drawn out under the hammer and afterwards bent cold into a spiral. Grooves or furrows were also found along the bore of the gun and parallel with its axis, proving unmistakably that not only the last shell but several previously had left the rifles and seriously injured the bore, and it can only have resulted from the extreme tenacity of the metal that the gun did not burst before. This bursting serves to us as a guarantee of the strength and excellence of the cast-steel guns supplied by Mr. Krupp. It also explains many circumstances that will arise in testing guns of heavy calibers, but which could not be ascertained with guns of smaller capacity. We learn by this experiment to avoid the jamming-in of the shot by using projections or wings of greater resistance than zinc. In pressing the shot home it must be carefully observed if the axis of the shot is coincident with the axis of the bore of the gun. To diminish the pressure of the wings and to avoid their cutting down the metal of the gun the pitch of the rifling should be decreased for heavy calibers. By now ordering a large number of Krupp's cast-steel guns, which is undoubtedly the best gun material hitherto known, we have surpassed other States, and there is no doubt that these guns, after having corrected some faults in the projectiles, will bring us an immense advantage by the use of such formidable weapons.

THE CHENANGO BOILER EXPLOSION.

We gave an account of this disaster on page 283 of the current volume, and since that time the coroner's inquest has developed the facts which we herewith place before our readers. Mr. Chief Engineer Wood, of the United States Navy, gave it as his opinion that the cause of the disaster arose from the accumulation of a greater pressure within the boiler than the stays and braces could sustain, and that they and also the shell gave way in consequence. Mr. Craig, also an engineer in the navy, and the Government inspector, states that he approved of these boilers and that he reported favorably upon them to the Government, but that he afterwards ascertained that the braces were not put in, in accordance with the specifications. Mr. Miers Coryell, superintendent of the Morgan Iron Works, where the boilers were built, had charge of their construction, and considered them safe at a much greater pressure than that which exploded them. Mr. Henry Mason, foreman of the Morgan Works, testified that he ran the engines during the 96 hours trial, demanded by Government, and that he found great trouble in keeping the water at a proper hight, and that the particular boiler which burst gave much anxiety on that account, and required more than ordinary care and watchfulness. Mr. George B. Riggins, who assisted in driving the engines on the trial, states that he also had great difficulty in keeping the water at a proper and safe hight, and that several times the piston struck quantities of water that had been carried over through the steam-pipe, with great violence; so great that the piston rod was forced one-sixteenth of an inch further into the piston than the fitters had been able to drive it in the shop. Mr. Joseph Belknap, a well-known practical and professional engineer of this city, and a person who has had a great deal of experience with steam engines and boilers, says, in effect, that the braces were defective in so far that they did not distribute the strain properly; he also says that it is possible to damage a boiler by hydraulic pressure, and render it less capable of withstanding steam pressure afterward.

The strain exerted by hydraulic pressure is only borne for a few seconds, and some part may be unduly tried, so that it becomes unsafe. Mr. Belknap says it is his opinion that the boiler-makers who were at work inside the boiler disconnected some of the braces and forgot to reconnect them, and that the explosion resulted from an excessive pressure, which parted the other stays, and subsequently ruptured the shell. He testifies that the iron was good, and that the plan of the boiler is as safe as any other when properly made.

Several naval engineers were also examined; and one—Elbridge Lawton—states that he has been in charge of a great many Martin boilers and considers them perfectly safe when properly managed, and that he never heard of trouble caused by foaming. Mr. De Luce, Chief Engineer of the Brooklyn Navy Yard, testified that the arches gave evidence of having been overheated; in his opinion there had been an unequal strain on the braces; one gave way and the others followed.

Mr. Warren Hill, draftsman and engineer of the Continental Iron Works, Green Point, gave very clear and explicit evidence, the most satisfactory that was elicited on the examination. He confined himself to facts, and stated that the number of stays or braces in the boiler, were, in his opinion, insufficient. Estimating the area of the part to be stayed, the pressure upon it and the number of stays put in to withstand said pressure, he found that the average strain upon each one was 21,600 pounds. This is fully one-fourth the tensile strength of the best iron in carefully-conducted experiments, and proves that what we surmised in our first article was correct, namely, that the rupture in the shell resulted from the breaking of the braces, or what is equivalent to it, their detachment from the parts they were intended

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to strengthen. Other engineers, examined on Monday last, gave it as their opinion that the Martin boilers were dangerous, from their liability to foam, and from the incessant care they required to prevent disaster.

It is noticeable that those most interested in the examination, and specially concerned in the verdict, express unbounded confidence in the boilers and plan of construction, and say, with all their experience, they have found little or no trouble with them. These men who thus testify are naval engineers, and it shows they are willing to abide by their testimony and risk their lives in support of their opinion.

It is not plain in the minds of those not immediately engaged in the examination of the witnesses, what decision will be arrived at by the jury, and at the day we go to prass we are unable to procure the verdict, but it would seem from the evidence adduced that the braces gave way in some manner and the roof or shell was torn in consequence. From two indicator-cards found in the engine room, the pressure on the gage was shown to be 34½ pounds; in another portion of the testimony the pressure shown by the gage is stated to be 39½ pounds; but whether this is a misprint or not we cannot say, as we were not present at any of the examinations. The coroner still continues his investigation, and when the verdict is rendered we shall publish it.

THE CLOSE OF THE METROPOLITAN FAIR.

The great Sanitary Fair has closed at last. The huge building in Fourteenth street still stands, but the garlands are gone, the lights are out, the guests have deserted it. There are no fair women passing in and out to enliven it any more, but the memory of their services remains and will never be forgotten. For over three weeks our citizens poured out their money like water for the sake of the sick and wounded soldiers in whose behalf the Sanitary Fairs all over the country have been instituted, and the net proceeds of our Fair, at the present time, reach $1,100,000, and this without counting the goods which remain on hand to be disposed of by auction. No other sensation has been permitted to interfere with the successful prosecution of this magnificent charity; and it will have an immense effect upon the conduct of our soldiers in the coming momentous campaign. The fields lie green around us and in the sunny corners of the valleys the branches of the trees are bursting into bud and bloom; in connection with this luxuriance and lavish generosity of nature the people will long remember the sympathy and devotion to the interests of the soldiers and the love of country shown by our women, as well, also, the sacrifices they have made to perform their duties to the end. The thoughtful visitor at the Fair who looked on the patient attendants sitting behind their counters and remembered that they were delicate, unused to toil, to the thousand-and-one endless questions, the dust, the noise, the heat, the incessant shuffling of feet, the blare of horns, the rattling of drums, the flapping of flags before their eyes, the overpowering odors—we say those who thought of these things fully appreciated the trial and the heroism which endured it meekly to the end. The triumph is theirs; whatever of glory belongs to the deed, let the crown for it fall upon our women; whatever of grace has been shown in their acts and intentions, let the reward of it be given to the women who have so richly earned it. All that is lovely and of good report, men cheerfully and unanimously accord to the ladies who planned and carried out the great Sanitary Fair.

SPECIAL NOTICE.

JOHN E. HEATH, of Berrian County, Mich., has petitioned for the extension of a patent granted to him July 22, 1850, for an improved machine for raking and binding grain.

It is ordered that the said petition be heard at the Patent Office, Washington, on Monday, July 11, 1864.

All persons interested are required to appear and show cause why said petition should not be granted. Persons opposing the extension are required to file their testimony in writing, at least twenty days before the final hearing.

THE arsenal at Springfield, Massachusetts, now contains 224,000 muskets.

Correspondence

The Cause of the High Price of Coal.

MESSRS. EDITORS:—The unusually high price of anthracite coal the past winter has been the subject of several articles which, from time to time, have appeared in the SCIENTIFIC AMERICAN and other journals, the general tenor of which has been to attribute the blame to the coal jobbers and miners, who, by combination or otherwise, have raised the price very much above its actual value. This may be true to a certain extent, but is not in my opinion the principal cause for these high prices. A visit made a few years since to the coal regions of Pennsylvania revealed to me certain facts which I think are not generally known, and which may throw some light on this subject. The mining business I found was no monopoly. It was not confined to those who happened to own coal lands, but was open to any one. Neither did it require a very large capital to carry on the business. Mines already opened could be obtained by paying from ten to twelve cents a tun on the amount of coal got out. All that was required were the necessary tools and an engine in some cases to draw out the coal and break it up. So far all is easy and under the control of those who mine the coal. To get the coal to market they must make use of the railroads and canals which run by the mouth of the mines, and over these they have no control. In fact the railroad and canal companies have entire control of the matter, and with them, I believe, mainly rests the responsibility of the high price of coal. The way they control it is by refusing to take it as freight. They will buy all the coal that is mined, paying their price for it, but refuse to carry it for others at any price. The miner therefore is obliged to sell his coal at the price these companies fix or not at all. What this price may be I know not, but at the time of which I speak it could be bought at the mines for seventy-five cents a tun for nut and one dollar for larger sizes. As late as last September but twenty-five cents a tun had been added to these prices; of course, then, these companies did not pay any more than that, and probably less. They take the coal at their prices, carry it to some seaport and sell it. Whatever price they get over and above the cost at the mines is so much freight. By this course not only the miners but dealers and consumers are completely at the mercy of these companies. The buying and selling prices are fixed by them, and those who mine as well as those who buy the coal are obliged to come to their terms. That this course is still pursued I have proof from a gentleman who visited the coal regions this last winter to buy coal. He found the proprietors of the mines anxious to sell at low rates, but they told him it was impossible to get the coal away except by private conveyance, and he was obliged to leave without purchasing.

Such are the facts, gentlemen, and so long as they exist we must expect to pay for our coal some four or five times as much as it is selling for at the mines. As a remedy for the evil I can suggest but two plans, viz:—1st, rival communications with the mines, and controlled by those who have as much regard for public as for private interests; or, 2d, what is better perhaps, let the Legislatures of the States interested oblige these corporations, by laws, to take coal freights the same as other merchandise is carried. When something of this kind is done we may expect to buy coal within three or four dollars a tun for what it is selling for at the mines, and not till then.

W. S. J.

Providence, R. I., April 21, 1864.

Steam on Canals.

MESSRS. EDITORS.—On page 166, current volume of your journal, I notice a communication under the heading, "Steam on the Tow-path." There is certainly much room for improvement in canal navigation, and I have longed to hear of some movement being made to this end. Hoping that the time for this improvement is near, I would offer my idea, which is neither to favor steam on the tow-path nor propellers, but instead, what I would denominate "pursuers." To understand this, I must explain. Let a hawser or cable be suspended over the middle of a canal for any distance, one or ten miles, properly secured at regular intervals. A boat with an engine of sufficient power is to be placed directly under the cable, and connected to it by machinery. By the operation of this machinery on the cable, the boat is to be moved forward, just as one would move a skiff by pulling along a rope stretched across a stream. A speed of at least 75 miles an hour could be obtained without difficulty, whilst the dangers of railroad travel would be overcome. One boat could be connected to another forming trains as on railroads. On the same plan rivers and coasts could be navigated. Though there are difficulties to this plan, yet greater have been overcome, and the day may not be far distant when traveling by water will leave railroading behind.

W. F. MAPPIN.

Mayslick, Ky., April 13, 1864.

[Seventy-five miles an hour ought to satisfy most persons. Correspondents mistake in making too high estimates, as it gives to many a good idea the appearance of a chimera, and deters sober-minded men from undertaking it.—EDS.

Sizes for Key-seats.

MESSRS. EDITORS.—We noticed, more that a year ago, that you requested some one to send you a list of sizes for key-seats for shafts, but we have waited in vain to hear an answer to your request from some one of more experience than we have. About two years ago we adopted the appended table as our standard sizes for key-seats. We have found it of great convenience to ourselves and certainly to our customers:

Diameter of Shaft. inches.	Key Seat. inches.	Diameter of Shaft. inches.	Key Seat. inches.
1	1-4 by 3-32	3 1-2	3-4 by 1-4
1 1-4	5-16 by 3-32	4	7-8 by 1-4
1 1-2	3-8 by 1-8	4 1-2	1 by 5-16
1 3-4	7-16 by 5-32	5	1 1-16 by 3-8
2	1-2 by 5-32	5 1-2	1 1-8 by 3-8
2 1-2	9-16 by 3-16	6	1 1-4 by 7-16
3	5-8 by 3-16		

We also adopted Nasmyth's standard sizes for shafting and also his taps and dies for screws. We consider the general use of a standard size for screws and also for the outside diameter of nuts to be of great importance. If the Government was to compel all their work to be done to standard sizes, we think its adoption by private manufacturers would soon be general.

SNYDER BROTHERS.

Williamsport, Pa., April 14, 1864.

[It seems to us these sizes are shallow for some metals, such as cast iron for instance; some of the large sizes decidedly so.—EDS.

Terrible Boiler Explosion in Philadelphia.

Another terrible disaster has occurred from the explosion of a steam boiler, in a Philadelphia factory. The *Evening Telegraph* of that city, dated April 25, says:—

"This morning our city was visited by another terrible boiler explosion, as sickening and horrible in its details as the one that recently occurred at the foundry of Messrs. Merrick & Sons, in Washington street. Both of these explosions, like many others of a similar fatal character, occuring on a morning after the boilers had lain idle over Sunday, afford a point which might be investigated in endeavoring to discover the cause of the affair. The yard in the center of the buildings was occupied by the boiler-house, which stood against the north wall, and was a substantial brick building, with an iron roof. There were in the building two tubular boilers, built by Morgan, Orr & Co., of this city, which had been in use about three years. The engineer who had charge of these boilers has been in the employ of Messrs. Cornelius & Baker also about three years, and every confidence was placed in his competency. At twenty-five minutes of eight o'clock, while all the employees of the establishment—about six hundred in number, men and boys—were engaged in various parts of the building, from the fifth story to the basement, the explosion occurred. Two distinct reports were heard, although it is known that only one boiler exploded. The engineer escaped on account of being absent from the boiler-room at the time, and was, it is said, in the office. In order to guard against accident, the firm had taken the precaution to have a steam-gage placed in their private office for their own personal inspection and safety.

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"The force of the explosion was most terrific—far more so than the explosion at Messrs. Merrick & Sons foundry. A five-story brick chimney, several feet square, standing against the north building and alongside the boiler-house, was completely razed to the ground, not one brick being left standing upon the other. Two "dipping" shops and the boiler-house were also laid in ruins, and all the windows in the establishment, several hundred in number, were more or less damaged. Some idea of the force of the explosion can be imagined when it is stated that a portion of the exploded boiler, about 750 pounds in weight, was carried to Twelfth and Cherry streets, and there striking a man on the head, killed him instantly. The deceased was employed in loading his wagon at the time of the accident.

"The boiler which did not explode was carried from its place up into the air, and was landed over a distance of a square from the factory. It passed through the top of the William Penn stables, running from Market to Filbert streets, and between Eighth and Ninth, instantly killing one horse and so badly injuring two others that they are not expected to live. The boiler did considerable damage to the stable. It passed through the roof and second floor, and forced one side of the stable out so far as to place it in an unsafe condition. Large pieces of the boiler and other flying *debris* were also hurled with force to a great distance, and windows for several squares off broken, although no one except the cartman mentioned above, was injured in this way. The yard—a hollow square formed by the buildings, was filled in some places half-way to the second story with piles of ruins. The five-story stack chimney, the boiler-house and the two dipping sheds were all a mass of ruins together."

[The cause of this disaster as of ninety-nine out of every hundred is carelessness of some kind. Attempts made to throw a veil of mystery over these disasters ought to be discontinued, it is simply begging the whole question and discreditable to the age we live in and the state of the mechanical arts.—Eds.

RECENT AMERICAN PATENTS.

The following are some of the most important improvements for which Letters Patent were issued from the United States Patent Office last week; the claims may be found in the official list:—

Applying Steam Power to Car Brakes.—This invention consists in the employment or use of a steam chest provided with a valve, a steam cylinder provided with a piston, and a spring and a valve regulator, all arranged in connection with a brake-actuating mechanism, in such a manner that the brakes may be subjected to any degree of pressure which may be necessary, and the communication between the boiler of the locomotive automatically opened and closed so as to render the desired pressure constant, whether the same be greater or less. The invention also consists in the employment or use of an escape valve applied to the steam cylinder and arranged in such a manner as to obviate any sudden increase of tension or pull on the brake chain, a contingency which frequently occurs when the train "stretches," and also to exhaust steam from the cylinder when the brakes are to be relieved. The invention further consists in a novel means for connecting the piston-rod with the brake chain whereby a short movement of the former is made to give the necessary length of pull to the latter, and admitting of a short cylinder being used, which is very desirable on account of space being limited where it is most desirable to place the cylinder. William Loughridge, of Neverton, Md., is the inventor of this improvement.

Bilge Block.—This invention consists in the addition to a bilge block of a piece so arranged on the top thereof and transversely thereto that it may adapt itself readily to the longitudinal curvature of the bilge of the vessel, and of such length that it may support two or more of the ribs of an iron vessel and thereby be prevented from indenting the outer skin thereof. It also consists in combining the hinged or adjustable upper portion of a bilge block with the base or body of the block by means of a screw by which it may be adjusted with greater facility than by the wedges commonly employed. Phineas Burgess, of Brooklyn, N. Y., is the inventor of this improvement.

Pulp Ink.—The object of this invention is to obtain an ink suitable for use on or in canceling stamps and for other purposes, the coloring matter of which will not separate itself from the menstruum and which will always be in condition for use, and which may be applied to a stamp or other device for producing an impression with the use of a pad; and to this end it consists in the admixture with coloring matter and a menstruum to form an ink, of the fiber or dust of leather by which the ink is brought to the condition of a permanent pulp throughout which the coloring matter is uniformly distributed. It also consists in the addition to such ink of paper sawdust, or finely reduced paper and cork dust or finely reduced cork either separately or together, when desired to give the ink greater solidity and to prevent the leather fiber from adhering to the face of the stamp or printing device. Richard H. Rogers, of New York City, is the inventor of this improvement.

Slide and Guide for Molding Flasks.—The two parts of a flask now used in molding or forming molds for casting are provided with two slides attached permanently to two opposite sides of one part of the flask, while the guides between which the slides work are attached to the corresponding sides of the other part of the flask. These slides and guides being permanent attachments, are very liable to become disarranged in withdrawing the casting, and the molder is required to resort to a carpenter to readjust them, and two slides and four guides are required for each flask. This invention consists in having the guides connected with plates, attached to one part of the flask and having the slides made separately and attached to the plates secured to the other part of the flask; all being so arranged that the slides may be readily connected to one part of the flask and the guides of one plate made adjustable, so that the slides and guides may always be kept adjusted in proper position and detached from the flask during the withdrawal of the casting, and two slides and four guides rendered sufficient for an indefinite number of flasks. S. A. Traugh, of Cincinnati, Ohio, is the inventor of this improvement.

Steel Shirt Collar.—This invention consists in the manufacture of a steel collar of a single strip of tempered steel plate painted and varnished, and so indented all round near its edges in imitation of stitching, that it may be worn either as a "turn-down" or "stand-up" collar. It also consists in the employment as a fastening for a steel collar of a metal stud soldered or otherwise fastened to its interior near one end to operate in combination with a hole near the other end, in such manner that no portion of the fastening is visible on the outside of the collar, whereby when worn as a "turn-down," it presents the same appearance as a linen collar made with an inside band and having its fastening in such band. It further consists in providing a steel collar on the inner side with metallic eyes or loops for the attachment of india-rubber or other flexible rings or loops by which to attach it to the buttons of the band of the shirt, such metallic eyes or loops also serving to keep the cravat or neck-tie in place when the collar is worn as a "turn-down. Louis Billon, of Brooklyn, N. Y., is the inventor of this improvement. Further information may be obtained of Messrs. Billon & Foggan, 76 Nassau street, New York City.

Apparatus for removing Starch Deposits.—This invention consists in the employment in a starch cistern of agitators secured to vertical shafts descending into said cistern at points outside its center and operated by means of a sun-and-planet gear, in such a manner that the effect of the agitators is equally powerful in the center of the cistern and at or near its skirts or circumference, and the accumulation of a deposit in the center of the cistern is obviated; the invention consists further in the application of a scraper extending clear across the center of the cistern and suspended from rods to which a rising and falling motion can be imparted by toothed racks and pinions or other equivalent means, in combination with a revolving ring or annular turn-table, in such a manner that said scraper can be adjusted up and down to any desired hight from the bottom of the cistern, and by its action, combined with that of the sun-and-planet agitators, the accumulation of a deposit on any part of the cistern is effectually prevented; the invention consists finally in the arrangement of a platform supported by and moving on rails over a series of cisterns, in combination with agitators and scrapers (either alone or both combined), which are vertically adjustable by screw rods, toothed racks, and pinions, or other equivalent devices, in such a manner that the agitating mechanism can be raised above the top edge of the cistern and removed by means of the rails supporting the platform, from one cistern to the other, and by these means one and the same agitating mechanism will serve for a series of cisterns. Wright Duryea, of Glen Cove, N. Y., is the inventor of this improvement.

Apparatus for cooling and disinfecting the Air in Vessels, &c.—This invention consists in combining with a refrigerating chamber and room, vessel or other closed space, the air of which is to be cooled or disinfected, an air conduit provided with or without a fan blower and arranged in relation to the ice or freezing mixture contained in said refrigerating chamber, in such a manner that the air while passing through said conduit will become cooled and flow into the room, vessel, or other closed space, without coming in contact with the ice or freezing mixture, and that the air contained in said room, vessel, or other closed space can be passed once or several times through said conduit either by the natural draught caused by the changes in its temperature or by an artificial draught, until its temperature is brought down to the desired degree; the invention consists further in the peculiar arrangement of a series of revolving drums on a hollow shaft, the interior of which is divided into several channels, in combination with the refrigerating chamber and with or without the fan-blower, in such a manner that the current of air created by the changes of its temperature or by the fan-blower, as the case may be, is compelled to make a long circuit in the interior of the refrigerating chamber and that its temperature is reduced considerably before it is allowed to leave said chamber. Alois Peteler, of New Brighton, N. Y., is the inventor of this improvement.

Machine for grinding Oil Paints.—This invention consists in the employment of one or more mullers, adjustable on arms extending in a horizontal direction from a vertical shaft, in combination with slip-weights and with a stationary bed or platform, in such a manner that by means of the slip weights the muller or mullers can be depressed upon the bed with more or less force as occasion may require, and by imparting to said shaft a rotary motion the muller or mullers are carried over the bed, and the operation of grinding paints can be effected by steam or any other suitable power in contradistinction to the ordinary method of effecting this operation entirely by hand labor. H. W. Gear, of 653 Broadway, New York, is the inventor of this improvement.

Ruffling Machine.—This invention consists in the combination with a fluting machine of a folding guide, so applied as to fold and double a strip of muslin, silk, or other fabric, and deliver it in its folded state between the rollers that the doubling and fluting may be performed by a continuous process. It also consists in the combination with fluting machine and folding guide of a flattening guide interposed between the said folding guide and the fluting rollers. It further consists in a folding guide of novel construction for doubling a strip of muslin, silk, or other fabric, by turning in both edges toward each other on the same side of the strip. Thomas Robjohn, of Mott Haven, N. Y., is the inventor of this improvement.

The bill to introduce the French metrical system into Great Britain has passed into a second reading in the House of Commons. The debate was not characterized by much profundity of thought or extent of information. We learn that Prof. Airey prefers of all others a binary division. From the beginning until now, it has been customary to divide by four rather than five. Four quarters are a natural division of anything.

According to Kirchoff, the great spectrum analyzer, the evidence of the existence of potassium in the solar atmosphere has broken down under closer examination, but additional evidence has been obtained of the existence therein of iron, nickel, barium, copper, zinc, strontium, cadmium, &c., and that no additional elements have been found in the sun.

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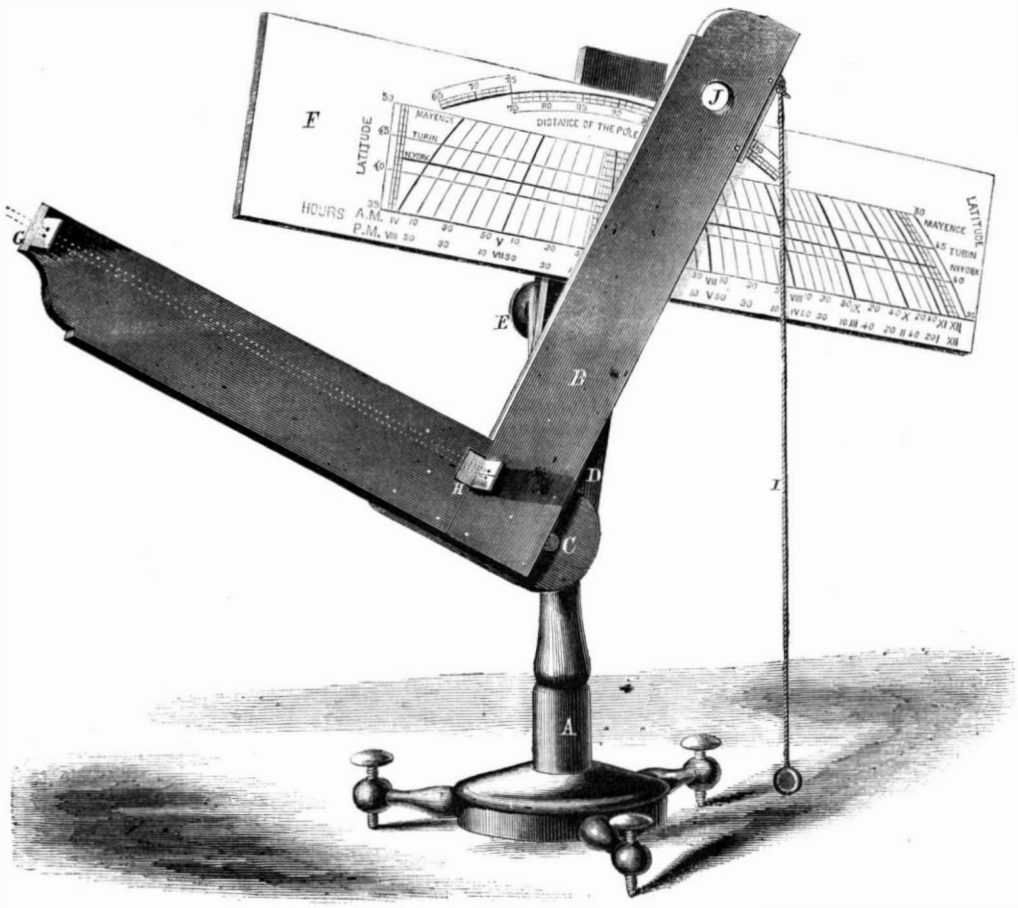
Improved Horoscope.

This apparatus is intended to show the hour of the day at any time when the sun shines. The engraving and description published herewith will serve to render the invention intelligible to all. The standard, A, carries an index arm, B, which works on a center at C. The vertical arm, D, is also fixed on a center at E, and carries the scale-board at the top; this is secured firmly to the arm, D. Close to the upper margin of the scale-board a scale of polar distances is drawn. The rest of the surface, except the ends, is occupied by the scale of hours formed of curved lines and marked from 4 A. M. to 8 P. M.; the hours are subdivided into spaces corresponding to two minutes; if desired still smaller divisions can be made on the scale. At the ends of the scale of hours are two other small divisions which indicate the different elevations of the pole.

Returning to the index arm again, we find that the lower arm has two small brass plates, G and H, fastened to it. The plate, G, is provided with two small holes to admit the rays of the sun, and the other plate, H, is marked with a black line on a white ground. At the upper end of the index arm there is another brass plate to which the plumb-line, I, is connected. The line is so fastened to the plate that it hangs between it and the scale-board. The hole, J, in the arm is merely to receive the plummet when the instrument is packed up, and the index arm is fixed in its place by a thumb-screw, so that it will not shift or move accidentally.

The time is ascertained by this instrument, when the sun shines, in the following manner:—A black line is drawn across the scale of hours to correspond to the latitude of the place where the instrument is to be used, and in taking an observation the instrument is placed upon a bench or other nearly horizontal surface, in such a position that the sun stands at the left, and that the shade of the scale-board appears in a straight line or nearly so. The polar distance of the sun, corresponding to the day on which the observation is made, is then ascertained from the tables sent with each instrument, and that point of the scale of polar distances marked near the upper margin of the scale-board, which corresponds to the polar distance taken from the tables, is brought vertically over the center of the pivot, E, which can be effected by turning the scale-board on its own pivot, and the plumb-line suspended from the arm, can be used to ascertain the desired position. In this position the scale-board is fastened by the jam nut, and the index, B, is turned on its own pivot, until the sun's rays, passing through two little holes in the plate, G, strike the brass plate, H. At the moment when the double image of the sun appearing in the form of two little disks, one standing over the other, is intersected by the black line, the plumb-line shows the hour and minute of true solar time at that point where the thread crosses the black line on the scale of hours.

This invention was patented through the Scientific American Patent Agency, by Michael Eblé, of the kingdom of Wirtemburg, on the 8th of Sept., 1863. For further information address Alphons Armbruster, Springfield, Ill.



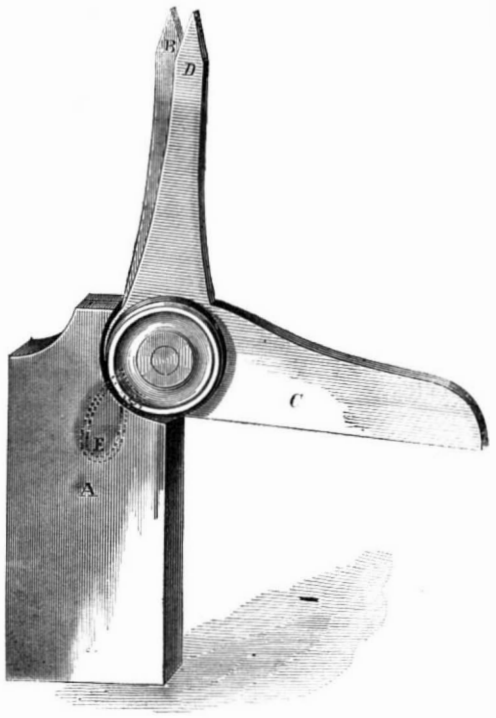
EBLE'S HOROSCOPE.

A Costly Sword.

One of the most exciting features connected with the recent Sanitary Fair, in this city, was the spirited competition carried on in the Trophy Room, in connection with a beautiful sword presented to the Fair by Messrs. Tiffany & Co., of this city. Books were opened and subscriptions were received from one dollar upwards for favorite generals of the army, each subscriber registering his name for whomsoever he or she might prefer. The contest was carried on between the respective friends of Lieut-General Grant and Major-General McClellan. 44,963 votes were cast, representing so many dollars. Of the whole number General Grant received 30,291, and General McClellan received 14,509—giving to the former a majority of 15,782, and 163 votes were cast for various other officers. One check for $10,000 was sent in from "The Loyal Men of New York." One "Loyal New Englander" sent in a check for $3,000. Thus ended the sword controversy.

RICHARDS' TRY-SQUARE.

The instrument represented herewith is one that will be highly appreciated by all mechanics who have



occasion to use a square. In most cases where one of these tools are employed, the workman has either to stoop and look under the blade or else bring his work up to the level of his eyes. This square renders such movements unnecessary, as may be seen by a glance at the engraving. The back, A, of the square has a pointer, B, forged with it, so that it is solid and immovable; in connection with this there is an arm, C, jointed by a rivet and washers to the back; this arm forms the blade of the square. The pointer, D, is attached to this blade, and the whole is so arranged that when the square is true, the two pointers, B and D, exactly coincide, thus showing at a glance whether the work is true or not. There is a small spring, E, set in the inside of the back which is connected to the working arm, or blade, C, in such a manner that it throws the pointers open so that when the square is applied to the work and taken from it again, the pointers will spring apart in order to register the next application of the tool to the work. This is a very useful square, as it saves a great deal of stooping and bending, and materially expedites the work. It was patented Jan. 26, 1864, through the Scientific American Patent Agency, by John Richards; for further information address the inventor, at the Ohio Tool Company's Works, Columbus, Ohio.

A Universal Time-piece.—We recently had the pleasure of examining a time-piece which was exhibited to us by the inventor, A. W. Hall, of this city. This time-piece is intended to show the correct hour on any locality of the globe, and it is of particular convenience for travelers, and at railroad stations, on vessels, &c. It is provided with two dials containing the names of the most important places on the globe, arranged in such relative position toward each other that, by the motion of said disks on the dial of the clock or watch, the correct local time of all the places marked thereon can be ascertained at any moment without calculation. The specimen time-piece exhibited to us by Mr. Hall is a watch, very neatly finished, and notwithstanding the limited space in which the disks had to be confined, the names of all the places marked thereon were easily distinguished.

Report of the Commissioner of Patents.

The introductive report of the Commissioner of Patents (Hon. D. P. Holloway), for 1863, is just issued; but it did not reach us in time to enable us to publish anything more than the statistics showing the operations of the Patent Office, which are as follows:—

Number of applications made during the year 1863	6,014
Number of patents granted, including re-issues and designs	4,170
Number of caveats filed during the year	787
Number of applications for extension of patents	40
Number of patents extended	48
Number of patents expired Dec. 31st, 1863	968

Of the patents granted there were to—

Citizens of the United States	4,048
Subjects of Great Britain	58
Subjects of French Empire	37
Subjects of other foreign governments	27
	4,170

The following is a statement of the Patent Fund :—

Amount to the credit of the Patent Fund January 1, 1863	$ 38,361 15
Amount paid in during the year	195,593 29
Total	$233,954 44
Deduct amount of expenditures during the year	189,414 14
Leaving to the credit of the Patent Fund January 1, 1864, the sum of	$44,540 30

In our next number we shall present some interesting extracts from the Report.

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THE

Scientific American.

MUNN & COMPANY, Editors & Proprietors.

PUBLISHED WEEKLY AT

NO. 37 PARK ROW (PARK BUILDING), NEW YORK.

O. D. MUNN, S. H. WALES, A. E. BEACH.

☞ Messrs. Sampson Low, Son & Co., Booksellers, 47 Ludgate Hill London, England, are the Agents to receive European subscriptions or advertisements for the SCIENTIFIC AMERICAN. Orders sent to them will be promptly attended to.

VOL. X. NO. 19..[NEW SERIES.].....*Twentieth Year.*

NEW YORK, SATURDAY, MAY 7, 1864.

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CONGRESSIONAL INTERFERENCE WITH PATENTS

Arguments against the extension of the Goodyear india-rubber patents were made on the 21st ult., before the House Committee on Patents by Horace H. Day, and also by Abraham Payne and J. H. Parsons, of Rhode Island, Tappan Wentworth of Massachusetts, and E. S. Day of Connecticut, in behalf of the manufacturers, one of the counsel representing the Eastern railroad companies, and by George Griscom of Philadelphia, who represented the railroad companies, manufacturers, and dealers of Pennsylvania. Earnest remonstrances have been presented against the extension by the Governors and members of the Legislatures of Pennsylvania and New York, and nearly all the railroad companies of the United States, and by many citizens.

Much solicitude is manifested on this subject owing to the immense pecuniary and manufacturing interests involved, and it is generally belived that the Committee will make a report unfavorable to the petitioners. We sincerely trust that this may be so, but it will not do now to relax any possible opposition in the expectation that the report of the Committee will be an adverse one. The Committee need to feel that the people are opposed to the further extension of these patents, that they are unwilling to be taxed for another seven years to support a monopoly for the special benefit of a limited number of wealthy corporations, which will thrive even if no longer allowed to control the Goodyear patents for their own special benefit. If we admit that the heirs of Charles Goodyear are poor, we maintain that it is no fault of the people or of the patent law. The testimony before the Committee clearly shows that the late Mr. Goodyear received large sums of money from his various patents, and also that he was improvident of his means. He spent his substance like water, when he ought to have taken care of it for the benefit of his family. If Congress is prepared to establish the dangerous precedent that valuable patents are to be extended to relieve the heirs of a deceased inventor who failed to provide for his own household, when ample means were at his disposal, then we say that the public have no guarantee against the revival of the monopoly system which became so odious during the reign of Queen Elizabeth.

History and experience have proved that there must be a limit to the grant of Letters Patent. The progress of the world in the arts and sciences demands that there should be such limit; and to guard against the evils which had already resulted from the system of extending patents, Congress enacted a law which went into force March 2, 1861, to allow patents to be granted for a term of seventeen years—instead of fourteen—and beyond which there should be no further extension. This change was not the effect of hasty legislation, but was the deliberate result of thorough experience. The public have a right to know how long an exclusive right to an invention is to exist, for unless this principle is fixed by statute there is little or no encouragement for other inventors to make improvements. A monopoly like the Goodyear patents, supported by millions of moneyed capital and controlling all the leading patent lawyers of the country in its service, can effectually put an embargo upon patents granted to others for india-rubber improvements, and such inventors and patentees must either sell their valuable rights for whatsoever these monopolists are pleased to give for them, or be crushed under the wheels of a legal and money Juggernaut.

We repeat what we have before urged in our columns, that the system of extending patents by Congress is not only dangerous, but it is unjust. It is a species of special legislation which is antagonistic to the principles of our Government; and up to this time, with few exceptions, Congress has refused to act favorably on such applications. If Goodyear's patents are extended there is no reason why hundreds of other inventors should not receive the same favor. There is nothing in this case of the Goodyear heirs which cannot, with equal justice, apply to the others; indeed the Goodyear case has much less to recommend it to the favorable consideration of Congress than some cases that we could suggest. Grant that the Goodyear inventions are valuable; grant that he suffered the pinchings of poverty; grant, also, that his children are not made rich out of his inventions. On the other hand, it is true that he has had his patents for the longest term allowed by law; he knew just how long the laws would protect his rights; and had he regarded the advice of his friends, himself and family would have rolled in the wealth which this protection afforded him.

If the Committee consider that the heirs are poverty-stricken, let them remember that the Government, as well as the people, consumes very largely of india-rubber goods, and rather than to favor the extension of the patent for another seven years, let Congress make an appropriation of funds for the relief of the heirs out of the public treasury. We know it will not be palatable to the heirs, and it will be a nauseating dose for those who monopolize the rubber business; but as a matter of strict justice and economy, this would be a fairer and more judicious disposal of the case.

CO-OPERATIVE SOCIETIES.

The greed for gain is not confined to the provision dealers in this country alone. In England the working classes have banded together in what they call "Co-operative Societies," which have for their principal objects the sale of food and groceries in general at a reasonable advance upon first cost. The societies in question realized the sum of £165,770 as net profits on trade last year. This one fact is worth all the assertions of all the "grumbling" grocers of England put together. There are 332 of them, and they are patronized by 90,450 persons. They seem to have been pecuniarily successful abroad; and there is no reason why they should not be equally so here.

In some of the eastern cities—New Bedford and others—this plan is, or was at one time, carried out under the title of "Union Stores;" and subscribers to the fund for the purchase of stock wherewith to carry on the business could buy their goods at a small advance on cost; and, if we mistake not, could receive a dividend annually from whatever profits accrued to the concern. It makes a very apparent difference in the housekeeping account of a family, whether butter costs 50 or 25 cents a pound; and so it is with other essentials of living. It was recently shown, by some careful compiler of statistics, in a daily journal, that the recent tremendous advance in the necessaries of life was mainly the result of the rapacity of middle-men and retail dealers. If this be the fact then co-operative societies are plainly good things, and to be encouraged; more especially at the present time. The plan is very simple, and is merely to start a subscription paper at from ten to fifty dollars, as individuals may choose, for the purchase of stock, &c., and carrying on the business; and then to retail the goods to *subscribers* at the least advance possible, in order to cover the interest on the investment, loss by wasteage, &c. To all other persons the prices would be the same as outside ones. To mechanics in small towns, and indeed in large manufacturing ones, even, such a plan as is here presented would seem to have positive advantages when placed under judicious management.

DEATH OF GENERAL TOTTEN.

Whether as field commanders the officers of the American army will compare favorably with those of other nations may be an open question, but there can be no question in regard to the Engineering Department. In both branches of their profession, in attack and in defense, in forts and in artillery, our military engineers have been for more than fifty years in advance of the military engineering of all other nations. By their long and persistent efforts our forts have been furnished with those enormous cannon which are the only weapons that can prevent the passage of ships past the front of fortifications; and their ingenuity devised that improvement in embrasures which, in the opinion of the best English officers, has reversed the relations of naval attack to military defense—has rendered forts invulnerable to the cannonade of fleets.

These triumphs of our military engineers have been in a large measure due to the genius and energy of the veteran head of the Department who, full of years and honors, has just been gathered to his fathers.

Joseph Gilbert Totten was born at New Haven, in the State of Connecticut, in the year 1788. He was educated at the national military school at West Point, and graduated in June, 1805, receiving at the time his first commission as second lieutenant of engineers. He served through the war of 1812, and through the Mexican war, steadily advancing in rank to that of general, and to the position of Chief Engineer of the United States Army.

In 1815, being called on to prepare a project for the defense of an important channel, he became convinced that the principles and the details by which the embrasures and casemates of forts had been to that time regulated were erroneous, and set about a careful study of the conditions to be fulfilled in providing for the heaviest guns of that period. The result was a design for an embrasure with the throat near the outer face of the wall, instead of placing the throat at the inner surface of the wall, as had been previously practiced. This improved form of embrasure was adopted, and is found in nearly all of our forts which were constructed previously to 1852.

At that time the gradual increase in the size of artillery had rendered necessary a greater thickness in the walls of forts, and this involved a modification in the form of embrasure. General Totten accordingly devised a new style of embrasure with an acute angle at the throat, and this could be rendered sufficiently strong only by making the throat of wrought iron. General Totten accordingly instituted a series of experiments to ascertain the thickness of plate required to resist the force of heavy shot at short range. These experiments settled positively the thickness of solid plate required to resist the force of 68-pound shot, and determined the form and material of the embrasures in our modern casemate forts.

It is a curious fact that the long series of elaborate and costly experiments which have been made by the English Admiralty had been anticipated by the engineers of the United States Army. We will also remark, in passing, that the account of General Totten's embrasures in Sir Howard Douglas's great work on "Naval Gunnery" is ridiculously inaccurate.

General Totten was held in the highest esteem by the most able and learned officers of the engineer corps, and his death will cause an emotion of sadness under all the thousand flags of our camps and fortifications.

A TRIBUTE BY MECHANICS.—One of the handsomest gifts to the New York Sanitary Fair is that of a splendid carriage, valued at $2,500, made at the well-known establishment of Wood Brothers, of this city. A small shield, suspended to the steps, bears this inscription:—"The labor on this carriage is contributed gratuitously by the workmen of Wood Brothers, New York."

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WHAT HUNGRY MEN EAT.

The reader who is comfortably housed and has an abundance wherewith to satisfy his hunger—who has only to go to the next corner, or to his cellar to procure the necessaries and even the luxuries of life—has but little conception of the straits to which men are sometimes put for want of food, or the substances hungry men take into their stomachs. The keen gnawing sensation occasioned by want of food is utterly unknown to those who live in cities; for although the "appetite" may be good, and excited as the hour of meal time approaches by the sight and smell of food, these emotions are soon dispelled and at least can be borne without great inconvenience for hours. But with that hunger which is akin to starvation the case is different. The most loathsome substances are eagerly seized, and these, which were revolting, become not only tolerably good but absolutely delicious.

That sentinel—the palate—and those pickets—the nostrils—challenge rigidly, in the quiet seclusion of home, every edible that approaches; but when the limbs tremble, when the great arteries no longer overflow with crimson blood, when the brain refuses to think and the eyes to see for want of something to eat, then that garrison—the stomach—receives whatever the highways and byways afford, or what the ungenerous soil may yield. In certain countries, as in Southern Africa and America, there are tribes called "dirt-eaters," who gorge themselves with a peculiar kind of clay, solely to distend their stomachs, so that they may appease nature. Once addicted to this habit it is ineradicable and they fall victims to intestine diseases caused by the abuse. Over the far Western prairies there roam skulking tribes or rather scattered parties of Indians called "Diggers." They are of all wandering savages the most despicable and degraded. They eat the roots of certain plants when unable to procure better food, and are glad to obtain grasshoppers and other insects which the white man looks upon as vermin. In parts of France, chiefly in the wine-making districts, there are found quantities of snails or slugs which frequent the vines; these reptiles are eaten by some and highly prized as delicacies, even by cultivated persons. We all know that the Chinese devour cats and dogs and even mice and rats, and that the edible birds-nests which form a portion of the diet of the higher classes in the country mentioned consist of a species of gelatine or semi-transparent mass which, after being cleansed, forms no despicable dish.

The human stomach must be satisfied at all hazards, and Dr. Kane and his followers found frozen walrus meat and polar bears' heads eaten raw, great delicacies; raw frozen livers he speaks of as delicious titbits. He also mentions that to the Esquimaux "belles" and native Greenlanders a pint of train oil or a bunch of candles was an appreciable gift, and the first was quaffed and the latter munched without loss of time. These are not freaks of appetite; but the promptings of nature, for fat contains more carbon—or, in plain English, more heat or fuel for the support of the vital flame—than lean meat; and it is therefore in those polar regions an imperative and indispensable article of food.

In Norway and Finland a coarse mixture, passing under the name of bread, is made from the inner bark of the pine or fir tree; and it is a well settled fact that the natives in certain parts of Africa eat a peculiar kind of ant with great avidity. Egyptians devour locusts and wild honey (when they can get it), and in the wilds of Southern Africa, round about the region of the Cape of Good Hope, the swarthy Hottentots gorge themselves to repletion when opportunity offers upon all parts of the beast killed. Abysinians and the subjects of the king of Dahomey refresh themselves with steaks, warm and raw, cut from the living animal; and the Kalmucks, a wild Tartar race, affect a beverage called *koumiss* which is made from mare's milk.

In all climes men feed just in proportion to their cultivation; and in conditions of extreme barbarity the animal man is but little above the brutes devoid of reason. Instinct governs the appetites of savages; and they are filled to repletion to-day, while to-morrow they starve.

THE productive capital in British railways is estimated at two thousand millions of dollars.

MACHINISTS AND THE SANITARY COMMISSION.

Our friends, the machinists, will feel pleased to know that their services in behalf of the sick and wounded soldiers, as well as their loyalty and devotion to the interests of the whole country, are not forgotten or overlooked. The *Spirit of the Fair*, a daily journal published during the recent exhibition in this city, pays this well-deserved compliment to the trade in question:—

"Perhaps no class of contributors to the Fair has done more substantial work for the cause, in shorter time, than the machinists. The Government has required lately from this most useful class so much labor at high speed and under great pressure, both mental and physical, that it is wonderful that they have been able to devote so much time and effort to the Fair as they have done. The committee on this class of contributions, too, was one of the latest formed, and had but three or four weeks for preparation. Besides the donations in kind and articles of machinery, engines, &c., sent in for exhibition, money has been contributed through this committee to the amount of nine thousand five hundred dollars, much of it through liberal subscriptions from the workmen themselves in the shops. If any stronger evidence of enlightened generosity can be found among the high-toned chivalry of the South, than has been shown in this and other instances by the greasy mechanics of the North, we should be glad to be reminded of it. One single contribution, by a working engineer, is that of a steam engine worth seventy-five dollars."

We think the above paragraph is about the best thing that has appeared in the *Spirit of the Fair* since its commencement. It has had very little "spirit."

ISSUED FROM THE UNITED STATES PATENT-OFFICE

FOR THE WEEK ENDING APRIL 19, 1864.

Reported Officially for the Scientific American.

☞ Pamphlets containing the Patent Laws and full particulars of the mode of applying for Letters Patent, specifying size of model required and much other information useful to inventors, may be had gratis by addressing MUNN & CO., Publishers of the SCIENTIFIC AMERICAN, New York.

42,336.—Propeller Engine.—Edward David Ashe, Brompton, England:

I claim the combination of the two engine cylinders, A, A′, piston rods, a, a′, guides, b, b′, drivers, h, h′, ways, C, C, and propeller shaft, B, formed with a plurality of intersecting spiral grooves, d, d, having two or more revolutions, when the said drivers, h, work on opposite sides of the said shaft, B, one in each of the grooves, d, d′, and all the parts are constructed and arranged to operate in the manner and for the purpose herein specified.

[The principal object of this invention is to obtain a high velocity o shaft without gearing, or in other words, to obtain two or more revolutions of the shaft of an engine from one stroke of the piston; and it consists in a certain construction and arrangement of a spindle grooved shaft in combination with drivers attached to the piston rods for this purpose.]

42,337.—Fluid Meters.—Edward John Baker, Philadelphia, Pa.:

I claim, first, The arrangement substantially as described, within a box or casing to which the fluid to be measured is admitted, of two measuring cylinders, with their reciprocating pistons, and with any system of valves, valve-seats and passages for admitting the fluid to, and discharging it from the said cylinders.

Second, The arrangement beneath the measuring cylinders of the slide valves J, the valve seats and ports substantially as specified.

Third, This arrangement substantially as described of the passages C and C′, and exhaust passage, D, beneath the valve seats.

Forth, The slide valves J, J, arranged in respect to each other and operated by a crank or eccentric on the central shaft, L, substantially as specified.

Fifth, The two cylinders with their reciprocating pistons in combination with the shafts, Q, arms, S and S′, rods, T and T′, arm or crank, U, and central shaft, L, the whole being arranged for joint action, substantially as and for the purpose herein set forth.

Sixth, The piston, G, composed of cups, n, and n′, of leather or other like material and perforated plates, n, and n′, all being constructed substantially as specified.

Seventh, The shaft, V, passing through the cover plate, A′, of the box, and having an arm or carrier, W, in combination with the central shaft, L, and its arm, U.

42,338.—Caster Wheel.—Thaddeus Beach, New York City:

I claim a caster wheel or roller having its fork or support, F, attached to a circular plate, E, provided with an upper beveled or inclined surface, d, and fitted within a circular box, A, having an inclined or beveled under surface, a, with conical rollers, C, interposed between the inclined or beveled surfaces, a, d, and either with or without the frame, B, substantially as herein set forth.

[The object of this invention is to reduce friction in the turning of the support of a caster wheel or roller while the latter is adjusting itself to the line of the movement of the article to which it is attached and at the same time admit of the wheel or roller being nearer the center of its support, whereby a more direct bearing than hitherto is obtained on the caster wheel or roller, and the latter made to act much more efficiently in supporting the article which sets upon it.]

42,339.—Holder for Butter Knife.—Henry Benton, Guilford, Conn.:

I claim the employment or use of the clasp, B, with spring socket, C, in combination with a plate, A, or its equivalent and with a knife, D, substantially in the manner and for the purpose herein shown and described.

[The object of this invention is to produce a simple and neat device which can be readily clasped to the edge of a plate or dish, and which is provided with a spring socket to hold a knife in such a manner that the knife is prevented slipping off from the plate or dish and soiling the table-cloth.]

42,340.—Anti-friction Stamper for Metallic Ore.—Joseph A. Bertola, New York City:

I claim, first, The movable bottom plate, r, and elastic bed, s, in combination with the hopper formed with a shute on one side for receiving the ores to be pulverized, and a spout on the other for the delivery of such ore, as specified.

Second, I claim forming the rod or handle for stampers of two metallic bars, between which the roller, f, for the lifting cam is fitted and which handle is grinded by fixed rollers, g and i, between such bars as and for the purposes specified.

42,341.—Chilian Mills for pulverizing Metallic Ore.—Joseph A. Bertola, New York City:

I claim the cross-head, l, on the shaft, g, with the chains or links, m, m, in combination with the axle, n, and pulverizing rollers, o, o, as and for the purpose specified.

42,342.—Fire-place.—Walter Bryent, Boston, Mass.:

I claim the above-described improved open fire-place as constructed with the air-heating chamber arranged about and so as to extend above its grate and the ash-pit or box, and open into the latter, in manner and so as to operate substantially as hereinfore explained.

42,343.—Car Coupling.—Henry A. Buck, Meadville, Pa.:

I claim the drop, B, curved and fitted in grooves or recesses in the draw-head A, as shown, in connection with the coupling pin, C′, and link or shackle, C, all arranged to operate substantially as and for the purpose specified.

[This invention relates to a new and improved car coupling of that class which are commonly termed self coupling, and it consists in the employment or use of a suspended drop placed within the draw-head and arranged in such a manner as to support the coupling pin when the latter is set or adjusted for coupling, and at the same time so arranged as to be out of the way of the link or shackle, when the latter enters the draw-head, and prevented from being acted upon by the link or shackle until the latter reaches the proper point to receive the coupling pin, thereby avoiding a casual dropping of the coupling pin before the link or shackle can receive it.]

42,344.—Photographic Printing frame.—Orrin H. Burdick, Auburn, N. Y.:

I claim the combination of the bowed or arched springs on the back, with the pivoted and horizontally turning arms on the frame, both the springs and arms having at least one free end, for the purpose of holding and regulating the pressure of the back, pad, and paper, to the glass in photographic printing frames, substantially as described.

44,345.—Bilge Blocks for docking Ships.—Phineas Burgess, Brooklyn, N. Y.:

I claim, first, The transverse self-adjusting top-piece, C, arranged upon the bilge block to operate substantially as and for the purpose herein specified.

Second, Combining the adjustable upper portion, B, of a bilge block, with the base, A, by means of one or more adjusting screws, F, substantially as and for the purpose herein specified.

42,346.—Anchor.—C. A. Chamberlain, Alleghany City, Pa.:

I claim, first, The reverser, C, constructed and applied to an anchor to operate substantially as herein specified.

Second, the elevator, E, applied and operating substantially as herein described.

Third, the depresser, E, applied and operating substantially as and for the purpose herein set forth.

Fourth, the guard, G, G, applied and operating substantially as herein described.

Fifth, The combination of the two flutes, A, A, arranged side by side, the reverser, C, elevator, E, depresser, F, and guard, G, substantially as herein set forth.

42,347.—Wooden Pavement.—Wm. H. Chappell, St. Louis, Mo.:

I claim the construction of wooden pavement with lumber which has been saturated with carbolic and cresylic acids or sulphate of iron and soluble glass, coated with pitchy mastic, from well oil residua, heavy oil and pitch from gas tar, and laid with cement made from sand, gravel, lime, pyrites, residuum, and soluble glass, covered with pitchy mastic, substantially in the manner as described in the specification.

42,348.—Grain-dryer.—George Clark, Buffalo, N. Y.:

I claim, first, The formation of hot air supply and evaporation escape passage through a body of grain by means of the horizontal perforated tubes, B and B′, the hot air tubes opening at one end through the kiln wall into a hot air chamber, E, and closed at the other end, and the evaporation tubes opening at one end into an evaporation chamber, on the opposite side of the kiln and being closed at the other, substantially as described.

Second, In the formation of a hot-air chamber, E, divided into compartments by the floors, E′, and the combination therewith of a hot air conducting flue, H, leading from the furnaces, the opening of the flue into said compartments being provided with regulating registers, substantially as described.

Third, The triangular or V-shaped tubes, B, B′, having open base (with or without perforations), for the purposes and substantially as described.

Fourth, In so arranging the alternate rows of hot air supply and evaporation escape tubes for passages) that kiln will pass alternately over hot air and evaporation tubes substantially as described.

Fifth, The combination of the hot-air supplying, and exhausting tubes, B, B′, constructed and operating as described, with the regulating valve, N′, substantially as set forth.

42,349.—Construction for Defense of Ships of War, and of Defensive Armor for Fortifications—Owen Collins, New York City:

I claim, first, The employment in the hull and turrets of a vessel or in fortifications, of a framing composed of independent tubular wrought-iron ribs, B, B, constructed and arranged as herein described.

Second, The external coils of steel wire, a, a, in combination of the aforesaid independent wrought-iron tubular ribs, as and for the purpose herein set forth.

Third, The employment in combination with the independent wrought iron tubular ribs, B, B, of surrounding casings b, b, of india-rubber or its compounds substantially as and for the purpose herein set forth.

Fourth, The combination of the framing of wrought iron tubes B, B, inner and outer skins, c, d, and corrugated plates, e, e, substantially as herein specified.

[The principal object of this invention is to obtain great impenetrability to projectiles with little weight and consequently with a high degree of buoyancy; and to this end it consists, firstly, in the employment in the hull and turrets of a vessel, of a frame composed of wrought-iron tubes arranged in the form of ribs: secondly in the reinforcement of such tubes for coils of steel wire to give them greater strength, and to aid by its elasticity in increasing the resisting power of the tubes: thirdly, in the employment between such tubes, of casings of india-rubber, or any compound thereof, to give them greater capability of resisting; and fourthly in the employment in combination with such tubes, of plates of corrugated iron applied in such a manner as to seam the said tubes together, and to attach inner and outer skins of smooth iron plates.

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42,350.—Grain Drill.—Wheeler M. Conger, Sugar Valley, Ohio:

I claim, first, The provision of nuts, N, N′, and fulcrums, a, a′, for adjusting the supplemental drag bars, L, L, and supplemental drill teeth, K′, K″, to a greater or less breadth of tillage in the manner set forth.

Second, Applying the drift chains or traces to a second cross rail A′ near the axle, C, substantially as and for the purposes specified.

Third, The provision of guards, Q, Q′, on the suplemental drag bars, L, L′, for the object stated.

42,351.—Manufacture of Tin Cans.—Edward T. Covell, Brooklyn, New York:

I claim uniting the sides of sheet metal cans by means of interlocking hook-shaped flanches, and solder, substantially as herein set forth; but this I only claim when the hooked-shaped flanches are completely formed upon the margins of the side sheets before the said sheets are joined together for the formation of the can.

When the sides of a sheet metal can are united with each other by means of the above-described interlocking hook-shaped flanches and solder.

I also claim screwing the heads of the can in proper position by means of grooves formed inside of the can for the reception of the heads, the joints being completed by the use of solder or other suitable cement

42,352.—Washing Machine.—M. C. Cronk, Auburn, N. Y.:

I claim the post, B, the sheath, D, the sleeve, h, the upright, I, the brace, g, and the lever, F, the whole arranged, constructed, and operated substantially as herein described.

42,353.—Shingle Machine.—H. C. Crowell, Morgan, Ohio:

I claim the adjustable gauge, G, either with or without the bar, H, in combination with the circular saw, B, and rising and falling bed, D, all arranged substantially as and for the purpose set forth.

[This invention relates to a new and improved machine for sawing shingles, heading for casks and other similar articles, and it consists in the employment or use of a vertical circular saw in connection with a rising and falling bed and a gauge or guide, all arranged in such a manner that the bolt may be held in the hand and fastened or fed to the saw in such a manner as to admit of the operator cutting up the bolt to the best advantage.]

42,354.—Churn.—J. B. Davidson, Oberlin, Ohio:

I claim The special arrangement of the break, N, guards, J, and lips, J′, in combination with the described revolving beaters, when operating conjointly as and for the purpose described.

I also claim the plate, f, and collar, d, on the shaft, c′, and the slide b′, when arranged and operating in combination with the described churn, substantially as set forth.

42,355.—Manufacture of Tin Cans.—Frederick W. Devoe, New York City:

I claim the lap, 4, in combination with the inwardly projecting rib joint, a, a, substantially as and for the purpose herein described.

[This invention relates to the rib joint which forms the subject matter of Letters Patent No. 40,661, granted to C. G. Reynolds, F. W Devoe, and C. Pratt, as assignees of H. Miller. That joint is well adapted for uniting the sides of square vessels, as it gives great stiffness at the corners, but it depends entirely on the cohesiveness of the solder for its capability of resisting any force which tends to tear it apart, it is not as strong in this respect as might be desired. The object of this invention is to remedy this defect, and to this end it consists in forming a lap at the edge of the rib by folding the margin of one plate or portion of the joint over that of the other plate or portion, the said lap serving to give increased strength to the joint, and also to increase the stiffness of the rib.]

42,356.—Scoop and Funnel.—J. F. Dubber, Brooklyn, N. Y.:

I claim the application of the valve, B, to the nozzle a, of a funnel A, in combination with the trigger, C, constructed substantially as herein described, so that said funnel can be used in place of a scoop and by introducing the nozzle into a paper bag and touching the trigger its contents can be readily discharged.

[This invention consists in the application to a funnel of the above description of a valve which closes the nozzle of the same and which is held closed by a spring in combination with a trigger or handle in such a manner that said funnel can be placed directly on the platform of a pair of scales, or suspended from their beam and used in place of a scoop and if the desired quantity of the article in question has been weighed into the same, its nozzle can be introduced in a paper bag and by touching the trigger the valve is opened and the contents of the funnel are discharged.]

42,357.—Snap Hook.—George R. Dunn, Newark, N. J.:

As a new article of manufacture, I claim the snap hook herein before described consisting of a cast metal body, A, a detachable spring D, screwed by a screw, d, and passing through and protected by the socket, C, all constructed and arranged as specified.

42,358.—Machine for removing Starch Deposits.—Wright Duryea, Glen Cove, N. Y.:

I claim, first, The agitators, B, arranged in combination with a cistern, A, on shafts, C, descending into said cistern at points outside its center and with a sun-and-planet gear, e a b c, constructed and operating in the manner and for the purpose herein shown and described.

Second, The scraper, I, in combination with the cistern, A, revolving ring, E, and one or more vertically adjustable bars, J, constructed and operating in the manner and for the purpose substantially as set forth.

Third, The platform, F, and rails, G, in combination with cistern, A, and agitating mechanism constructed and operating in the manner and for the purpose substantially as set forth,

42,359.—Balanced Slide Valve.—Robert Faries, Indianapolis, Ind.:

I claim the stationary protecting cover, C, of arched or other equivalent form in its transverse section in combination with the packed valve, A, having a transverse section of corresponing form substantially as and for the purpose here specified.

I also claim in combination with such valve and cover, the tube, d, for preventing leakage of steam around the valve stem substantially as and for the purpose herein set for forth.

And I further claim in combination with such valve and seat the grooves, n, n, and passages, m, m, substantially as and for the purpose herein specified.

[The object of this invention is to relieve the back of the slide valve of the pressure of the steam or other fluid in the valve chest and thereby reduce its friction and wear; and to this end it consists principally in making the valve of arched or equivalent form in its transverse section and fitting it with suitable packing to a stationary protecting arch or cover which extends right over it, from one side of the valve seat to the other.]

42,360.—Rolling Metal.—William Field, Providence, R. I.:

I claim the method hereinbefore described for rolling flat bar iron or other metal.

42,361.—Oil Stone Fountain.—James Funk, Beverly, Ill.:

I claim the employment or use, with an oil-stone, of an oil-fountain provided with valves and placed in the lid or cover of the case of the oil-stone, to admit of the stone being supplied with oil from the fountain, substantially as herein set forth.

I further claim the vibrating plate, H, provided with the yielding heads covered with cork or other suitable material, in combination with the revolving toothed wheel, G, and the holes, i i′ and j. made respectively in the bottom and top of the oil fountain, all arranged to operate in the manner substantially as and for the purpose herein set forth.

[This invention consists in combining an oil fountain with an oil-stone in such a manner that the stone can be readily supplied with oil at any time as required, while, at the same time, the two combined articles will not exceed much, if any, the dimensions of an ordinary-cased oil-stone provided with a lid or cover.]

42,362.—Shirt.—S. H. & C. E. Furman, New York City:

I claim a shirt with permanently-attached studs and closed wristbands without buttons or studs, constructed substantially as described.

42,363.—Hand Grenade.—G. P. Ganster, New York City:

I claim the peculiar construction and arrangement of the compound chambers, c d, in combination with the ball, e, for separating the chambers, c and d, their respective chemical contents, together with the detent, f, and its mechanical arrangements, substantially as described and for the purposes set forth.

42,364.—Machine for grinding Oil Paints.—H. W. Gear, New York City:

I claim the employment or use of one or more mullers, H, adjustable on arms, G, which extend in a horizontal direction from the vertical arbor, C, in combination with slip weights, h, and with the stationary bed, B, all constructed and operated in the manner and for the purpose substantially as herein shown and described.

42,365.—Drilling Machine.—Alexander Gordon, New York City:

I claim the adjustable clamp and feeding nut combined with each other and with the drill spindle, to operate substantially as and for the purpose herein described.

[This invention relates to the mode of feeding the drill, and it consists in controlling the feed by means of an adjustable friction clamp applied to the nut which is fitted to a screw thread on the rotating spindle which carries the drill stock.]

42,366.—Snap Hook.—R. E. & A. Gorton, Franklintown, N. Y.:

I claim, as an improved article of manufacture, a snap hook made as herein shown and described, with a spring socket, e, spring, f, snap, B, eye, g, and projection, h, all as set forth.

[This invention relates to an improved snap hook or fastening for attaching traces to whiffletrees and also to the breechen of a harness, when the horse is not attached to the vehicle, and the traces require to be held, &c.]

42,367.—Coffin Plate.—W. H. Green, Meriden, Conn.:

I claim the construction and attachment of a back to a coffin plate, the said back having corresponding ridges to fit the grooves presented on the back of the front plate, which will admit of the insertion of any name and age requiring the ordinary number of letters or figures between it and the front plate after the two are united.

Also, I claim the invention of the slot or opening in the end or side, and middle of the back, through which the letters and figures are inserted.

Also, sealing the line of figures or letters by striking up or punching up a period at the end,

And the use of letters and figures struck up from sheet metal instead of cast ones, for this purpose.

41,368.—Spring Mattress.—John G. F. Grote, Cincinnati, Ohio:

I claim, first, The arrangement of frame, A B C C′ D E, body springs, F, cording, G g′ g″, band, H, yielding head frame, K, and graduated springs, I I′ and J, the whole being combined and operating together as set forth.

Second, The described combination of head frame, K, cords, G″, and graduated springs, I I′ J, resting partially upon the frame and partially upon the yielding band, H.

42,369.—Spring Mattress.—John G. F. Grote, Cincinnati, Ohio:

I claim the combination of the equilateral body mattress, A B, base, C, bolster, D, and legs, F f, constructed, arranged and operating substantially as and for the purposes specified.

42,370.—Convertible Planter and Cultivator.—S. E. Harrington, Greenfield, Mass.:

I claim, first, In combination with the main frame of a machine which may be used as a seeding machine or for other purposes, the hopper, agitator, measuring device, chute drill and markers, when constructed in such a manner that they may all be removed from said main frame by one and the same operation, substantially as set forth and for the purpose described.

Second, The combination and arrangement of the hopper, F, frame, G, agitator, K, lever, k, and spring, r, post, H, shoe, I, disk, J, and markers, O, constructed and operating substantially as described.

Third, In combination with the main frame and dray-bars of a seeding machine or cultivator, the spring-bolt coupling, N, constructed and operating substantially as described.

Fourth, In combination with the main frame of a machine which may be used as a seeding machine or for other purposes, and provided with a plate, T, the cultivator bars, P P, when crossed at their middle and provided with clamping bolts, S S, substantially as described.

Fifth, In combination with the main frame of a machine which may be used as a seeding machine or for other purposes, the fenders, E E, substantially as described and for the purpose set forth.

42,371.—Machine for grinding and amalgamating Gold and Silver.—Wm. H. Hepburn & G. K. Peterson, San Francisco, Cal.:

We claim, first, The conical bottom, a, of the pan, B, in connection with the conical muller, H, in shell form, arranged substantially as and for the purpose set forth.

Second, The shoes, P, provided with curved beveled edges and attached to the under side of the muller, H, so as to form oblique curved grooves, p, in connection with the spiral flanges or ribs, m*, on the upper side of the muller, as and for the purpose specified.

Third, The arrangement of the hand wheels, O N, thimble, L, and tubular screw, M, substantially as described for raising and lowering the muller, as set forth.

[This invention consists in the employment or use of a pan provided with a conical bottom, and a muller which is in the form of a conical shell and provided at its upper surface with spiral ribs or flanches and at its under surface with shoes so disposed and arranged as to form spiral grooves, all being so constructed and arranged to operate in such a manner that all the pulp or pulverized ore will be brought in contact with the quicksilver in the pan and all the particles of gold perfectly amalgamated.]

42,372.—Ore Separator.—Charles D. Hicks, Denver, Colorado:

I claim the separator wheel, C, provided with a central cavity, a, sloped sides, b, and an annular trough, c, and secured to an oscillating adjustable arbor, D, in combination with the pyramidal chute, B, and sluice, A, all constructed and operating in the manner and for the purpose substantially as shown and described.

[This invention consists in the employment of an oscillating separator provided with a hemispherical central cavity, sloped sides and an annular semi-circular trough in combination with an adjustable shaft, pyramidal chutes and common sluice in such a manner that the small particles of quartz and gold passing through the perforated bottom of the sluice are conducted to the central cavity of the separator and by the oscillating motion imparted to said separator and by the action of its sloped sides the gold contained in the quartz settles down to the bottom of the central cavity and annular trough, and the light particles are carried off by the water.]

42,373.—Window-tightener.—O. C. Hill, Malone, N. Y.:

I claim the above described new and improved device for holding a strip placed in a groove in the edge of a window-sash, for the purpose of tightening the window and supporting the sash when raised.

42,374.—Tank for Hot-houses.—Henry E. Hooker, Rochester, N. Y.:

I claim the particular construction and arrangement of the troughs or tanks, A A′, the same consisting of the simple self-supporting and insulated sides and partition, a a a, and the bottom, D, of hydraulic mortar arranged relatively with the earth, E, and sides and partition, a a a, substantially as and for the purposes herein set forth.

42,375.—Riveting Machine.—James Howell & David Birdsall, Jersey City:

We claim the combination of the trip hammer, D, spring, d, dies, e f, gage, g h, and the stop catch device, F, when constructed and operated substantially as described.

42,376.—Washing Machine.—Robert B. Hugunin, Cleveland, Ohio:

I claim the corrugated surfaces, C and D, substantially as and for the purposes specified.

I also claim the arrangement and combination in connection with the surfaces, C and D, of the shaft, B, yoke, E, lever, J, plate, K, as and for the purposes herein shown.

42,377.—Corrugating Circular Metal Plates.—R. B. Hungunin, Cleveland, Ohio:

I claim the arrangement of the cones, A A, as and for the purposes herein shown.

I also claim the arrangement and combination of the plates, C C, gears, F F, boxes, D D D D, collars, E E E E, and cones, A A, as and for the purposes herein described.

42,378.—Washing Machine.—D. F. Hunt & F. S. Lyon, South Norwalk, Conn.:

We claim the fluted roller, D, placed in the frame, A, which is attached to the wash-tub, B, by clamps or any suitable fastenings in combination with the small fluted rollers, F, having their shafts, a, fitted in segments, G, which are connected together by pivots, b, and connected to the hinged frame, H, all arranged as shown to form a new and improved washing or rubbing attachment for the purpose specified.

[This invention relates to a new and improved portable washing attachment to be applied to wash-tubs. The object of the invention is to obtain a simple and economical device for the purpose specified, and one which will admit of the clothes being washed and perfectly cleansed without the liability of being injured and with but a little expenditure of power or labor.]

42,379.—Revolving Fire-arm.—B. F. Joslyn, Stonington, Conn.:

I claim, first, Making that portion of the piece, E′, which penetrates the portion, E, shorter than the case of the cartridge so as to prevent the accumulation of dirt between the two parts of the cylinder, as set forth.

Second, The piece, E′, with the plate, a, and radial ribs, n, and recesses for the reception of the heads of the cartridges, the whole being constructed substantially as and for the purpose set forth.

42,380.—Apparatus for Fumigating.—K. P. Kidder, Burlington, Vt.:

I claim a fumigator composed of a box or case, provided with a fire chamber or perforated partition, substantially as and for the purpose herein set forth.

I further claim the elastic tubes, C D, in combination with the case, A, substantially as and for the purpose specified.

[This invention consists in the employment or use of a case or box, formed of two parts and provided with a fire-chamber or a perforated plate, as hereinafter fully shown and described, whereby animals may be effectually smoked out of holes or hollow trees and bees stupified or subdued with the greatest facility.]

42,381.—Caster.—Christian Knisely, Chicago, Ill.:

I claim the two tubes, A C, in combination with the rod, B, caster-wheel, E, and with or without the yielding pin, F, and groove, b′, all arranged substantially as and for the purpose herein set forth.

[This invention relates to a new and improved caster such as are used on piano-legs and on the legs of furniture generally. The object of the invention is to obtain a caster of the kind specified, which will admit of being readily attached to its leg, be capable of turning easily and one which will admit of always being kept in a properly lubricated state, and not liable to slip out from the leg in case of the piece of furniture being raised from the floor.]

42,382.—Caster.—Christian Knisely, Chicago, Ill.:

I claim the oil chamber, E, in the frame, C, of the caster-wheel, D, in combination with the rod, A, secured in the leg to which the caster-wheel is applied and fitted in the oil-chamber, substantially as and for the purpose set forth.

I also claim in combination with the rod, A, and oil-chamber, E, the yealding pin, d, fitted in the frame, C, and the groove, c, in the rod, A, for the purpose specified.

I further claim the plate, B, on the rod, A, provided with an annular groove, a, in its under side, in combination with the flange, b, at the upper end of the oil-chamber, E, as and for the purpose herein set forth.

[This invention relates to a new and improved caster for the legs of furniture, light furniture, or such as have small legs that will not admit of large rods being inserted in them. The invention consists in having an oil-chamber in the frame of the caster-wheel into which the lower part of a rod that is driven into the leg is fitted, and on which rod the frame of the caster-wheel is allowed to turn freely, the end being provided with a cap which covers the oil chamber and a spring catch employed to hold the caster-wheel frame on the rod.]

42,383.—Steam Boiler.—A. T. Lackland, St. Charles, Mo.:

I claim the arrangement of the furnace flue, d, return flues, b b, and the water-jacket surrounding the furnace, substantially as shown and described.

42,384.—Alarm Steam Gage.—L. L. Lee, Milwaukie, Wis.:

I claim, first, A cluster or group of floats consisting of three or more in combination with the yoke, J, and lever, C, substantially as and for the purpose described.

Second, The yoke, J, in combination with screw, N, for the purpose of adjusting the floats, substantially as described.

Third, The collar, E, in combination with the adjusting pins, F F, and guide, R, substantially as and for the purpose described.

42,385.—Method of applying Steam-power to Car Brakes.—Wm. Lougridge, Neverton, Md.:

I claim the steam cylinder, O, and steam chest, I, provided respectively with the piston, Y′, and valve, J, and communicating with each other and the boiler, A, substantially as described when said parts are applied to or connected with a car brake to operate in the manner substantially as and for the purpose set forth.

I also claim the connecting of the stem, K, of the valve, J, with the bar, E, provided with a spring, D, the latter being connected with the brake cam, Z, and piston-rod, Y, to operate as described.

I also claim the particular manner of connecting the valve stem, K, with the bar, E, by means of the wheel, F, and rack, L, in connection with the lever, G, for raising the valve, J, and the notched bar, H, for holding said lever, for the purpose herein specified.

I also claim the escape valve, V, applied to the cylinder, O, substantially as shown when used in connection with the foot-rod, X, and for the purpose herein set forth.

I further claim the arrangement of the lever, U, pulley, m, at the end of the piston-rod, Y, rod, T, attached to one end of lever, U, and the brake chain, Z, attached to the opposite end and passing around the pulley, m, substantially as and for the purpose set forth.

42,386.—Drying Fruit.—Ira Lynde, Marathon, N. Y.:

I claim a device for drying fruit composed of a shallow box, A, provided with shelves or partitions, e, and having its broad sides or top and bottom formed of strips, b, of cane or other material, or of wire rods or wire cloth, substantially as herein shown and described.

[The object of this invention is to obtain a simple and portable device for drying fruit, one which will admit of being suspended against a wall, or laid in a horizontal position, or adjusted or placed in any position, and changed in position from time to time, as the facilitating of the drying process may require

42,387.—Fruit-gatherer.—F. A. Maxfield, East Spring Hill, Pa.:

I claim the sheet or canvas, A, provided with a cut, g, and a hole, i, and having rods, B, attached to its sides which are fitted upon and

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supported by stakes, d, substantially in the manner as and for the purpose herein set forth.

[This invention relates to a new and useful device for gathering fruit, whereby the same may be shaken from the tree without injury and the labor of picking by hand avoided. The invention consists in the employment or use of a sheet or canvas attached to rods and arranged in such a manner that it may be made to encircle the trunk of the tree and receive the fruit as it drops from the tree; the sheet or canvas being supported by stakes which are driven in the ground and the sheet or canvas provided with a hole through which the fruit escapes into a proper receptacle or basket.]

42,388.—Metallic Wad for Cartridges.—Edward Maynard, Washington, D. C.:

I claim my improved gun wad, formed of a circular disk, with a projecting cylindrical edge or rim, substantially in the manner and for the purpose herein set forth.

42,389.—Steel-bladed Oars.—W. H. McMillan, New York City:

I claim as a new article of manufacture the oar herein described consisting of a wooden handle, A, and metal blade, B, when the said parts are constructed and combined as and for the purpose herein specified.

42,390.—Grain Drill.—F. S. Mills, Iberia, Ohio:

I claim, first, In combination with a seed distributing roller, b, composed of two parts, b* b*, each provided with cavities, 7 7', shaft, d, divided longitudinally in a plane or planes coincident or parallel with its axis into parts of segmental form one attached to each part of the roller, b, for moving the same, substantially as herein described.

Second, The vertically adjustable arbor, h, and bevel gears, f f' g g', in combination with roller, D, and seed-distributing roller, b, constructed and operating as and for the purpose set forth.

Third, The lever disk, K, with belts, K* K*, in combination with the hinged draught pole, L, rocking roller, J, belts, G*, and shoes, G, all constructed and operating in the manner and for the purpose specified.

Fourth, The combination of the spring-bars, I, with the vertically adjustable shoes, G, and sectional roller, D, as and for the purpose described.

[This invention relates to certain improvrments in that class of seeding machines which can be used for distributing corn or other seeds in hills or in drills or broadcast, and which roll the seed in the ground.]

42,391.—Implement for Transplanting.—Francis Milo, Kingston, Canada West:

I claim the case, A, constructed so as to be expanded and contracted by the movemeut of the slide, B, in combination with the plates, D D, all arranged substantially as and for the purpose set forth.

[The object of this invention is to obtain a simple and efficient device by which the roots of shrubs and plants may be protected from injury while being transplanted or removed from place to place.]

42,392.—Ore Separator.—F. A. Morley, Sodus Point, N. Y.:

I claim the use of a horizontal current of water, produced by the water-wheel, D, or its mechanical equivalent, for the purpose of conveying materials of different specific gravities into different receptacles, substantially in the manner and for the purpose described.

42,393.—Cheese Press.—Nathaniel Norcross, Livermore, Me.:

I claim the combination of the press beam, D, double racks, H, double pinions, F, and friction shaft, G, when constructed and arranged substantially in the manner and for the purpose described.

Arranging two or more sets of presses within the same frame when each press is composed of the press beam, D, double racks, H, double pinions, F, and friction shaft, G, as herein set forth.

42,394.—Needle-threader.—James O. Kane, New York City:

I claim, first, The groove, c, with the inclined sides and end, receiving the needle and determining the position of the eye, in combination with the tapering hole, b, for the thread, as specified.

Second, I claim the spring-guide and holder, e, in combination with the groove, c, for the purposes and as specified.

42,394.—Machine for dressing Staves.—Jason Palmiter, Jamestown, N. Y.:

I claim the two knives, K K, in combination with the feed rollers, D D, and the loaded lever, H, when used in connection with a rocking bearing, a', fitted on trunions, c c, all arranged for joint operation as and for the purpose set forth.

[This invention relates to a new and improved machine for dressing staves, that is to say, for shaving or sizing them of proper dimensions and giving them the proper curved form in a transverse direction. The invention consists in the employment or use of stationary curved knives, in connection with fluted feed rollers.]

42,396.—Preserving Eggs, Meats, &c.—James Perkins, Newark, N. J.:

I claim the application and use of lac varnish in combination with gum-arabic, substantially in the manner and for the purposes described

41,397.—Whitening Currier's Slicker.—Daniel Peters & W. D. Wilson, Keokuk, Iowa:

We claim a slickering tool for curriers use, provided with an oscillating or adjustable blade, substantially as herein shown and described.

We further claim the bolt or latch, C, fitted in the handle, A, and arranged in connection with the blade, B, to operate substantially in the manner herein described.

[This invention consists in inserting the blade of the tool in the handle of the same in such a manner that the blade may be oscillated or moved in the handle, and assume an angular portion therewith at either side of it.]

42,398.—Apparatus for concentrating Milk, &c.—Julius R. Pond (Bakerville P. O.), New Hartford, Conn.:

I claim the combination of the rotating curved pipes, d d d, of unequal length for stirring and heating the milk, a perforated helical pipe, f, for distributing heated air over the entire area of the vessel, and an eduction pipe, a, all substantially as herein described and for the purpose specified.

[This invention relates to condensing or concentrating milk or other liquid substances by evaporation produced by the combined effects of the application of steam heat below the surface, the application of currents of hot dry air above the surface, agitation and the connection of the evaporating vessel with a chimney or other means of producing a draft, whereby the condensation or concentration is effected very rapidly at a comparatively low temperature, and at a small expense.]

42,399.—Machine for finishing Leather for Cotton or Woolen Cards.—Garret S. Quick, Auburn, N. Y.:

I claim, first, The stationary rubbers (two or more) pressed together by means of springs or their equivalents, as above described.

Second, In combination with the rubbers above described, the two rolls, S and T, for drawing the leather through between the two series of rubbers.

42,400.—Car Coupling.—Cornelius M. Radcliff, Piermont, N. Y.:

I claim the compound coupling formed of the latches, h and l, constructed and acting substantially as set forth.

I also claim the chain or rope, m, passing from the latch, l, through the eye, 3, and along the front edge of the platform in combination with the said compound coupling, for lifting the same as set forth.

42,401.—Plow.—Daniel Rhodes, Pawtuxet, R. I.:

I claim the arrangement of the vertically-moving frame, H, arms, f, roller, R, and loop, E, with the clevis, I, beam, A, lever, F, and guide, G, all in the manner herein shown and described.

[The object of this invention is to obtain a simple and efficient device which may be operated at any time when the plow is in use, for varying the line of draught so as to give the point of the share a greater or less tendency to enter the ground, and thereby regulate the depth of the furrow as may be desired and keep the same at a desired uniform depth, however undulating the surface of the ground may be. Address Mr. R. care of the North American Bank, Providence, R. I.]

42,402.—Car Spring.—G. Adolph Riedel, Philadelphia, Pa.:

I claim, first, Constructing the plates, A and B, with the circular recesses, a a a a, or with conical holes, a', for the purpose of receiving the ends of the springs, C, substantially in the manner and for the purpose set forth.

Second, Combining the springs, F, with the springs, C, and the plates, A and B, substantially as described and shown.

Third, Surrounding the springs, F, with the spring, G, for the purpose of giving greater strength to the nest of springs, and also to preserve their perpendicular position, substantially as described.

Fourth, Constructing the springs, C, and the springs, F, of wire which has two acute angles, which in the formation of the springs constitute the extreme top and bottom parts of the folds thereof, the top and bottom edges of the folds being parallel, and their perpendicular sides also parallel to each other, substantially as described and for the purposes above set forth.

Fifth, Constructing the top and bottom edges of the folds of the springs, G, with a V-depression in one edge and a corresponding elevation on the other, substantially in the manner and for the purpose set forth.

Sixth, The buttons or clamps, D, in combination with the tubes, E, when arranged and operating in relation to the plates, A and B, substantially as set forth.

42,403.—Band Ruffle.—Thomas Robjohn, Mott Haven, N.Y. Ante-dated Feb. 19, 1864:

I claim a banded ruffle, whether crimped, fluted, ruffled or shirred, when said ruffle is made of two thicknesses of goods, substantially as herein described.

42,404.—Apparatus for making Fluted Ruffles.—Thomas Robjohn, Mott Haven, N. Y.

I claim, first, The combination with a fluting machine of a folding guide constructed and arranged to deliver a strip of muslin or other fabric to the fluting rollers and to fold and double the said strip as it is drawn through it by the said rollers, substantially as and for the purpose herein specified.

Second, The combination with the fluting machine and the folding guide of an interposed pressing guide, substantially as herein specified.

Third, Forming the said interposed pressing guide as part of a socket which receives and holds in place the folding guide, substantially as herein specified.

Fourth, The combination with a fluting machine of the folding guide, C', constructed to turn in the two edges of a strip of muslin or other material toward each other on the same side of the strip, substantially as herein specified.

42,405.—Ink for Hand-stamps, &c.—Richard H. Rogers, New York City:

I claim the admixture with a coloring matter, and a menstruum of the fiber or dust, of leather to produce a "pulp ink," substantially as herein described.

And I also claim in combination with the use of the fiber or dust of leather in an ink, the use of finely reduced paper or cork, or both of those ingredients, substantially as herein specified.

42,406.—Apparatus for sponging Cloth.—Louis Rothschild, New Haven, Conn.:

I claim the use of a perforated and covered cylinder, standing vertically and stationary, in combination with a boiler, for the purpose of sponging and shrinking cloth, when the whole is constructed, combined, and used, substantially as herein described.

42,407.—Manufacture of White Lead.—Robert Rowland, New York City:

I claim the manner herein described of converting granulated lead into white lead, by subjecting it while in a state of agitation to the action of oxygen, acetic acid, and carbonic acid, substantially in the manner and for the purpose herein described.

I also claim inducting the gases used in the carbonization of lead into a revolving drain by means of separate pipes or tubes, provided with stop-cocks so that the supply of each of the gases can be regulated independently of the other, substantially in the manner and for the purpose herein described.

42,408.—Harrow.—Andrew Safley, Mount Vernon, Iowa:

I claim, first, The combination of the two vertically adjustable harrows, E E, the guide bars, i i', attached thereto, the draft rods, j j', frame, A, and wheels, B B, all as herein shown and described.

Second, In combination with the above I claim the rotary segments, F F', hand levers, H H', spring dogs, d d', serrated bars, e e', and chains, c c', all constructed and operating in the manner and for the purpose specified.

[This invention consists in the arrangement of two vertically adjustable harrow guided by vertical bars, and suspended from a frame which is supported by two wheels in such a manner that said harrows are brought close to the team, and thereby the draught is rendered lighter than with ordinary harrows, that either harrow can be raised or lowered independent of the other, and adjusted to any desired depth, and that each harrow is correctly guided and kept square to the team, causing each tooth to do its work in the proper place, and furthermore by the arrangement of a long seat on the frame, so that the driver is enabled to move back or forward, the weight bearing on the tongue and neck-yoke can be regulated.]

42,409.—Grain Separator.—Benjamin D. Sanders, Wellsburgh, West Virginia:

I claim, first, Constructing the spout, G, with two or more passages varying in length, whether said passages be enlarged upward or are of equal dimensions throughout, substantially as and for the purpose described.

Second, So constructing and arranging a spout with two or more passages that independent currents of air have a free access into their lower ends at different elevations, substantially as and for the purposes described.

Third, So constructing one or all of the passages of a spout, G, and furnishing a hopper to one or all of the passages, that the grain shall enter the spout at a point above the lower end of each respective passage, substantially in the manner and for the purpose described.

Fourth, So applying independent hoppers to two or more passages of a spout, G, that the grain from the highest hopper falls upon a lower hopper, and in its passage from the different hoppers is acted upon by separate blasts of air in the different passages of the spout, substantially as and for the purpose set forth.

Fifth, So arranging perforated or imperforated hoppers with respect to one another and the termini of the passages of the spout that an unobstructed passage above the hoppers for the flow of air into the ends of the passages of spout, G, is obtained, substantially as and for the purposes set forth.

Sixth, A separating machine having a spout and hoppers constructed and operating so as to control the grain and air, substantially in the manner set forth.

42,410.—Harvesting Machine.—Jacob Seibel, Manlius, Ill.:

I claim in a reaping or harvesting machine, the combination of the endless apron, M, the binding attachment, A A', and the lever, i, cord, f, ratchet levers, m m', and the sliding posts, S S', arranged and operating substantially as and for the purposes delineated and described.

42,411.—Snow Plow.—James Sheridan, St. Louis, Mo.:

I claim, first, The spring, E, attached to the shaft, C, in connection with the spring, H, or an equivalent projection also attached to shaft, C, and the stop, I, attached to the under side of the platform or bottom of the car, and the plow or scraper, G, attached to the spring, E, all arranged either with or without the link, J, substantially as and for the purpose herein set forth.

Second, Constructing the plow or scraper, G, of a triangular portion e, of wood covered with sheet metal, f, and provided at its lower end with a curved projecting front piece, f', an adjustable plate, K, and spur or guard, L, substantially as herein set forth.

[This invention consists in a novel manner of attaching the snow plow to the car, whereby the fomer is allowed to yield or give to obstructions which may lie in its path, as well as to the friction produced by the bearing of the plow against the sides of the rails in turning curves; the plow being also allowed to yield or give under a vertical movement of the car, or a variation of the hight of the the same, caused by the play or elasticity of the car springs under different loads. The plow, also, by the arrangement or mode of attachment, being capable of being readily raised from the rail, at the will of the driver or attendant. The invention further consists in a novel mode of constructing the plow whereby the parts of the same which are exposed to wear, may, when worn, be readily replaced by new ones, and the plow always kept in proper working order.]

42,412.—Magic Lantern.—George Sibbald, Philadelphia, Pa.:

I claim, first, A magic lantern producing on a screen outside the lantern, by reflection, an image of a picture of any desired description placed in the lantern, substantially in the manner herein specified.

Second, The picture-holder, b c d, or its equivalent, arranged in that side of a magic lantern, A, opposite the lens tube, E, in combination with one or more lamps, B, and reflectors, D, constructed and operating in the manner and far the purpose substantially as herein shown and described.

Third, Extending the lens tube, E, far enough in the interior of the lantern so that the lens, f, at its inner end is not exposed to the direct rays of light emanating from the flames of the lamps, B, as and for the purpose specified.

Fourth, The stems, d', projecting from the backs of the reflectors, D, and provided with flanges, e', in combination with the lantern, A, constructed and operating in the manner and for the purpose substantially as set forth.

Fifth, The hinged wings, e, in combination with the plate, d, and slide, a, constructed and operating substantially as and for the purpose described.

[This invention consists in a magic lantern producing an image on a screen outside the lantern by the reflection of a picture of any desired description placed in the interior of the lantern and exposed to the rays of light obtained from one or more lamps, or other artificial sources of light.]

42,413.—Burning Lime.—Edward A. Smith, St. Albans, Vt.:

I claim, first, The application of the heated blast to ignited anthracite coal in a kiln having a cylindrical cone-shaped cupola combined with a boiler plate providing room in the base for the fire chambers, all constructed and arranged as herewith described.

Second, I claim the lime-pit and door in the throat of the boshes providing for the more rapid delivery of the lime, and forming a gage or measure by which to ascertain the amount drawn and to be drawn in the practical working of the kiln, all constructed as herewith described.

42,414.—Match Safe.—G. H. Snow, New Haven, Conn.:

I claim the sliding box, B, in connection with the stationary box, A, the rod, C, and spring, D, or its equivalent, all arranged to operate substantially as and for the purpose herein set forth.

[This invention relates to a new and improved safe for friction matches, and it consists in the employment or use of a sliding box arranged with a fixed rod and fitted in a case in such a manner that by forcing down the sliding box a match will protrude through the top of the box, so that it may be grasped by the thumb and finger, and readily abstracted from the box.]

42,415.—Elastic Roller.—Leander R. Streeter, Chelsea, Mass.:

I claim constructing elastic rollers by filling a flexible cylinder or case, wholly or in part, with disintegrated caoutchouc, whether damaged by use or not, for purposes and substantially as described.

42,416.—Harvester.—Benaiah Titcomb, Baltimore, Md.:

I claim, first, Attaching the friction roller, B, Fig. 4, to the side of the frame, D, directly under the vibrating arm of rock-shaft, C, Fig. 5, in the manner and for the purpose specified.

Second, The construction of the frame, D, and yoke, D', in one continuous piece, in the manner and for the purpose substantially as set forth.

42,417.—Pump.—James Tomlinson, Racine, Wis.:

I claim the stationary piston, A, with globular chamber, C, and valve, D, in combination with the reciprocating cylinder, E, globular chamber, F, valve, G, ascension pipe, H, and hand-lever, I, all constructed and operating in the manner and for the purpose herein shown and described.

[The object of this invention is to construct a pump with the least possible amount of valve surface, and with a long stroke so that the same can be used in deep wells, and comparatively little power is required for its operation.]

42,418.—Paper-ruling Machine.—Edward Town & James L. Chichester, Buffalo, N. Y.:

We claim, first, The mechanical combination described in this specification, and designated as the "gaging device," meaning and intending to include in this claim any combination whatever of any of the parts or elements which constitute this device, amounting to a mechanical equivalent of the same, and this we claim, whether such combination is used in single or double machines either for ruling or printing, or whatever may be the design or purpose, for which this combination is used to gage or regulate the run of paper on a machine.

Second, We also claim the mechanical combination described and designated in this specification as the "striking device," or any combination constituting a mechanical equivalent of the same.

Third, We also claim the shaft, F, with all the cams and devices connected therewith, designed to connect all the parts of the two devices above specified and claimed, and to operate the same in connection with each other and with the other parts of the machine, as described and set forth in this specification, meaning and intending to include in this claim any device or arrangement, constituting substantially a mechanical equivalent thereof.

42,419.—Slides and Guides for Flasks for Molds.—S. A. Traugh, Cincinnati, Ohio:

I claim the employment or use, with flasks for forming molds for casting of detachable slides and adjustable detachable guides arranged and applied to the flask, in the manner substantially as and for the purpose herein set forth.

42,420.—Harvester.—W. O. Tubbs, Spring, Pa.:

I claim, first, Fastening the heel end of the finger-bar in its socket in the sustaining shoe, by means of the lever, e, combined with said shoe, substantially in the manner and for the purpose shown and described.

Second, The arrangement of the bent lever, s, and pitman, D, in combination with the sliding-head, H, and rocking-beam, G, for the purpose of throwing said beam in and out of gear with the cam wheel, E, and firmly bracing the same when in gear, substantially as described.

Third, The employment of the bent lever, b, in combination with the driver's seat, Y, and its support, in the manner and for the purpose described.

42,421.—Gas Burner.—Joseph Wadsworth, Marple, England, & James Wadsworth, Salford, England:

We claim an improved gas burner, manufactured of sheet metal, having the nipple made of one piece and knurled, milled, or spun in, so as to form a neck, leaving the cavity of the same size above the neck as below it, substantially as and for the purpose set forth.

42,422.—Gate.—Wm. B. Waldo, Johnsville, N. Y.:

I claim the arrangement of the rings, E, levers, D D', and ropes, F F', with the lever, C, post, G, and pendant catches, H, all constructed and operating in the manner herein shown and described.

[This invention relates to an improved gate-operating mechanism of that class designed to admit of the gate being opened and closed by a driver from a vehicle or a rider on horseback. The object of the invention is to obtain a simple device for the purpose, and one which will operate in the most efficient manner, and be capable of being actuated by the driver or rider with the greatest facility and without the liability of a vehicle being injured by coming in contact with any of the parts thereof.]

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42,423.—Composition Soles and Molds for the same.—Preston Ware, Jr., Boston, Mass.:

I claim, first, A vulcanized rubber sole, or made of any suitable composition whether vulcanized or not in which the holes designed to contain the nails or rivets, whereby it is fastened to the boot or shoe are countersunk so that the heads of the nails, rivets, &c., may be beneath the surface of the sole, substantially in the manner and for the purposes set forth.

Second, I claim forming such holes by means of pins of the form, and inserted in the molds in the manner described.

Third, I claim the method of molding rubber or composition soles provided with holes by first filling the molds with the compound or composition in its plastic stase, and by subsequently forming therein the holes by driving the pins or cores into the molded mass, as described.

42,424.—Grain Drill.—T. W. Watts, Rushville, Ill.:

I claim the arrangement of the seed-box, A, shaft, B, arms, i, plates, c c, triangular openings, b d f, spouts, F G H, and scattering board, F, all constructed, combined, and operating in the manner and for the purposes specified.

[This invention relates to a new and improved seeding machine for sowing seed broadcast, and for sowing grass seed simultaneously with grain. The invention consists in an improvement in the seed-distributing device and also in the scattering board, whereby the desired end is accomplished in a perfect manner.]

42,425.—Alarm Gage-cock for Steam Boilers.—Henry Wilkins, Brownsville, Pa.:

I claim combining a gage-cock or valve applied to a steam boiler, with a cam, or its equivalent, operated by a clock movement or other device for producing rotary motion, in such manner that the said cam or equivalent shall produce the periodical opening of the said cock or valve, substantially as and for the purpose herein set forth.

[This invention consists in combining an ordinary gage-cock or suitable valve applied to the boiler just below the extended water level, with a cam operated by a clock movement or other device for producing rotary motion, in such manner that the said cam shall produce the opening of the said cock or valve periodically, and so indicate by the sound of the issuing water or steam whether the water is above or below the said cock.]

42,426.—Apparatus for molding Pulleys.—James Yocom, Philadelphia, Pa.:

I claim, first, The vertical cylinder, D, arranged in respect to the plates, A and C, and for operating in conjunction with the said plates, substantially as and for the purpose herein set forth.

42,427.—Nursing Bottle.—Sigismund Zeno, New York City:

I claim the application of a flexible connecting tube, C, between the spout and body of a nursing bottle, substantially as and for the purposes shown and described.

[This invention consists in the employment or use of a flexible tube to form the connection between the spout and the body or a reservoir of a nursing bottle in such a manner that a baby nursing from said bottle can take the reservoir in its arms and the spout in the mouth, and while sucking move its head in either direction without losing the spout, or change the position of the reservoir without pushing the spout up in its mouth or drawing it out therefrom.]

42,428.—Steam Bell-ringer.—Wm. H. Beach, Chicago, Ill., assignor to J. S. Beach, Ballston Spa, N. Y.:

I claim the combination of the wheel, A, steam casing, B, shaft, a, and crank, b, with a bell, substantially as and for the purpose herein specified.

[This invention consists in a steam bell-ringer of novel and very simple construction, intended more especially to be applied to locomotives for ringing whenever desired by the engineer whether the locomotive is running or standing still, but applicable to other purposes. It is composed of a wheel with suitable floats placed in a suitable casing to which steam is admitted by a small pipe from the boiler to act upon the floats, and from which, after acting upon the buckets to produce a rotary motion of the wheel, it escapes by another pipe or opening to the atmosphere, the shaft of the said wheel being furnished outside of the steam casing with a crank which is connected by a rod either with a rocker to which the bell is attached to produce the swinging of the bell itself or with the clapper, so that by the rotary motion of the crank the ringing of the bell is effected.]

42,429.—Steel Shirt-collar.—Louis Billon (assignor to himself and John Foggan), Brooklyn, N. Y.:

I claim a steel shirt-collar made with indented edges, concealed stud, b, eyes, e f, and flexible loops or rings, g, in the manner herein shown and described.

42,430.—Gas Regulator.—James E. Boyle, Brooklyn, N. Y., assignor to himself, Dudley Kavanagh, and Geo. Stevens, New York City:

I claim the hollow valve-stem and valve and two diaphragms of unequal diameter combined in a gas regulator, substantially as and for the purpose specified.

I also claim the opening and closing of the valve of a gas regulator by the pressure of the gas upon the surfaces of two diaphragms of unequal diameter, substantially as described.

42,432.—Sash-sustaining Window-frame.—Hartzel H. Center (assignor to himself and Theodore Marsh), Cincinnati, Ohio:

I claim the combination of the four separate flat-faced strips, G G′ G″ G‴, springs, I I I I, and sockets, H H′ J J′, all constructed, arranged, and operating in the manner and for the purposes herein specified.

42,432.—Cooking Stove.—Addis E. Chamberlain (assignor to Chamberlain & Co.), Cincinnati, Ohio:

I claim the deflecting plate or screen, F, constructed as described with cheeks, G G′, flanges, H, ears, J J, and a register, K, the said screen being secured within the fire-chamber, as herein specified and for the purpose set forth.

42,433.—Roller for rolling Iron.—Andrew B. Clemons (assignor to himself and Royal M. Bassett), Derby, Conn.:

I claim in combination with rolls so arranged as to admit of the distance between their faces being varied, a mechanism substantially such as described for operating upon the roll, in the manner and for the purpose described.

42,434.—Cuff-fastener.—Alexander Douglas, English Neighborhood, N. J., assignor to himself and Samuel S. Sherwood, Aquackanonck, N. J.:

I claim the fastener, C, constructed substantially as described, that is to say one end thereof being formed into a spring link, to secure it from displacement by interlocking with the eye of a button, in the manner set forth, and the other end extending from the link so as to be capable of securing other buttons in their proper places, substantially as set forth.

42,435.—Locking the Cylinder of Revolving Fire-arms.—Thomas Gibson (assignor to the Starr Arms Company), Yonkers, N. Y.:

I claim the arrangement and combination of the bolt, E, with the fulcrum pin, a, of the pawl or finger, D, in the manner and for the purpose herein shown and described.

[This invention consists in the employment or use of the pivot of the pawl or finger which serves to impart motion to the revolving cylinder, in place of the cam to release the bolt or latch from the cylinder in such a manner that the construction of the hammer is simplified, and the cam brought in such relation to the bolt that the end of the shank of said bolt is less liable to wear away than it does with the means of the ordinary construction, and consequently a correct operation of the bolt in regard to the cylinder is insured.]

42,436.—Spring Pen-holder.—David E. Hall (assignor to himself and James H. Beardsley), Brooklyn, N. Y.:

I claim the spring portion, b, of the pen-holder extending from the cylindrical part, a, to the pen-socket, c, and returned within the cylinder, a, as and for the purposes specified.

42,437.—Air-pump.—H. H. Hendrick (assignor to himself and J. J. Riddle), Cincinnati, Ohio:

I claim, in air pumps of the construction specified, the combination of the elastic valve, D, with the seat, E, spring, F, cylinder, A, and piston, B, all arranged and operating as described.

[This invention consists in the application of a cone valve made of or covered with india-rubber, leather or other flexible material, in combination with a common hard-metal valve seat and with a reciprocating piston, in such a manner that any impurities, such as hairs or fibers, which may detach themselvee faom the packing of the piston and lodge between the valve and its seat, do not prevent the valve from closing down air-tight, and the operation of the pump is not interrupted.]

42,438.—Sun Blinds.—Julius Jeffreys, Upper Norwood, England, assignor to R. L. Jeffreys and Lindsay Wilson. Patented in England Jan. 28, 1860:

I claim combining the parts, c d e f h i, in a case, a b, substantially as above described.

42,439.—Water Elevator.—S. F. Jones (assignor to himself and E. L. Floyd), St. Paul, Ind. Ante-dated April 8, 1864:

I claim a water elevator, comprising the wheel, G, spool, H, spool, I, chain, L, weight, C, and bucket, B, all substantially as arranged and combined.

42,440.—Harvester.—W. A. Kirby, Auburn, N. Y., assignor to himself and D. M. Osborne:

I claim, first, The clearing rod, B, constructed, arranged and operating as and for the purpose described.

I also claim the combination of the adjustable clearing rod, adjustable reel and adjustable rake, for the purpose of adapting the machine to the cutting, gathering and delivering of ordinary as well as short crops, as herein described and represented.

I also claim the rake head, k, so made as that the rake may be set forward or back thereon, in the manner and for the purpose described.

I also claim, in combination with an intermittent rising and falling and sweeping rake, the overpoised switch and cam ledge, for actuating the same, as set forth.

I also claim, in combination with the wheel, J, and its radial slots, and the arm, L, with its spring bolt, for operating the rake, the wedge or trigger, 5, for disengaging the two at every revolution, substantially as described.

42,441.—Desulphurizing Metals and Ores.—L. G. Marshall (assignor to himself and Andrew Cochran), New York City:

I claim the use of petroleum oil intermingled and combined with the heated water, borax, sal ammoniac or prussiate of potash, to be applied in a fluid state, through a pipe or pipes, to my tubular furnace or any other furnace for desulphurizing ores.

42,442.—Steam Cooking Apparatus.—B. G. Martin (assignor to W. Sanford, J. L. Seabury and J. Truslow), New York City:

I claim the pipe, c, with branch pipes, c′, in combination with the heating chamber, A, jacket, B, and steam space, b, constructed and operating in the manner and for the purpose substantially as herein shown and described.

[The object of this invention is to obtain an apparatus which will cook, roast or boil provisions of any desired description, either by the direct application of heat from the fire to an oven, or by the action of steam brought in contact with the articles to be cooked, or by the application of heat derived from water and steam combined, which surround the heating chamber.]

42,443.—Steam Boiler.—C. M. Miles (assignor to himself and C. F. Jones), Vineland, N. J.:

I claim the combination of the fire-box, B, the chamber, D, the short ascending flues or tubes, d d, the long-descending flues or tubes, E e e, and surrounding water tubes, G and f f, and lower chamber, F, substantially as herein specified.

I further claim, in combination with the parts above specified, the casing, I, applied substantially as described.

[This invention consists in a novel arrangement and combination of fire and smoke or gas boxes, water, fire and gas or smoke tubes, and water spaces in a vertical boiler, by which is obtained a very large and effective heating surface, and extract from the gaseous products of combustion all their availabie heat before permitting them to escape to the chimney, and so greatly economize fuel.]

42,444.—Soap Composition.—J. B. Rand, Fishersville, N. H., assignor to himself and Jason Smith, Bennington, Vt.:

I claim the combination and process of mixture and incorporation of the ingredients above-mentioned, for the purpose herein set forth.

42,445.—Manufacturing Casks.—William Reid (assignor to himself and Thomas Reid), West Hebron, N. Y. Ante-dated April 15, 1364:

I claim, first, The hollow or tubular cylindrical and rotating cutter, C, in combination with the sliding clamp, D, arranged substantially as and for the purpose set forth.

Second, The particular manner of constructing the cylindrical cutter, C, to wit, by having the spaces, c, between the teeth, a, filed or cut to form grooves with feather edges at their outer ends and having the teeth, a, project out beyond the periphery of the cylinder with a spiral flange, b, attached to the latter, as and for the purpose herein described.

[This invention relates to an improved machine for manufacturing casks in an expeditious and perfect manner, and it consists in the employment of a rotating hollow cylinder provided at one end with teeth or cutters formed or constructed in a novel way, and having a spiral flange attached to its periphery, in combination with a clamp and feeding device, all being arranged in such a manner as to effect the desired end.]

42,446.—Puddling Furnace.—F. M. Raschhaupt (assignor to A. J. Fleury and J. G. Kershaw), Philadelphia, Pa. Ante-dated April 6, 1864:

I claim the application of the cinder or waste of puddling and other furnaces, pulverized and solidified with clay and lime, to the protection of puddling and other furnaces, substantially as and for the purpose described.

42,447.—Apparatus for generating Carbonic Acid and other Gases.—Fr. M. Raschhaupt (assignor to A. L. Fleury and J. G. Kershaw), Philadelphia, Pa. Ante-dated April 9, 1864:

I claim the vessel, A, with its air pump or other device for imparting pressure to the interior of the vessel, the cylinder, G, and reservoir, H, or their equivalents, and the system of pipes and cocks, or their equivalents, the whole being constructed substantially as and for the purpose herein set forth.

42,448.—Steam Boiler.—T. Shaw, Philadelphia, Pa.:

I claim a gauze cylinder when constructed so as to surround the opening for the passage of the steam.

42,449.—Sewing Machine.—Rosewell Thompson, Boston, Mass., assignor to Alfred B. Ely:

I claim, first, Making the shuttle stitch by means of a double-revolving hook, so constructed as to close together when entering the loop formed by the needle, and spread the thread or loop apart wide enough during its revolution to encompass a commercial spool, substantially as described.

Second, The spool case, R, so constructed that its lower end may end upon its center only to facilitate the passage of the thread under and around the same, substantially as described.

Third, The hinged wire, T, in combination with the spool case, R constructed and operating substantially as described.

Fourth, The shield, W, combined and arranged substantially as set forth, for the double purpose of protecting the cast-off thread from the revolving hooker, and causing the under thread to draw perpendicularly from the center of the spool case.

42,450.—Sizing Paper.—Geo. E. Vanderburgh, Mamaroneck, N. Y., assignor to C. E. Hodges and Wm. B. Newbery, Dorcester, Mass., N. D. Silsbee, Roxbury, Mass., and John Richardson, Boston, Mass.:

I claim the application of sizing of soluble alkaline silicate, substantially as set forth.

42,451.—Lasting Pincer.—Andrew West, Canton, Ohio, assignor to himself and John Staub, Sparta, Ohio:

I claim, as a new article of manufacture, a pair of boot and shoe-lasting pincers constructed substantially as above described and as shown in the accompanying drawings.

42,452.—Holder for Car Doors.—Germond Crandell, Washington, D. C.:

I claim the combination of a sliding door supported on wheels or rollers with an indentation, depression in, or removal of the track, d d, at the points, c c c, in which to admit the wheels, b b, to adjust themselves, when the door is either open or closed, arranged to operate in the manner and for the purposes herein set forth.

RE-ISSUES.

1,653.—Melodeon.—Stanley A. Jewett, Cleveland, Ohio. Patented Oct. 13, 1857:

I claim, first, The production of a perfect mute by combining the action of the air passages, m N O, or their equivalents, with the mute valve, L, as herein set forth.

Second, The formation of a gradual swell or crescendo and diminuendo by means of operating the swell valve, T, by the contraction and expansion of the bellows or its equivalent, as herein specified.

1,654.—Apparatus for disinfecting Foul Air in Vessels.—Alois Peteler, New Brighton, N. Y. Patented Sept. 9, 1861:

First, I claim disinfecting vessels, rooms or other closed spaces by forcing the air contained therein through contracted passages which are reduced in temperature by means of a cooling agent confined within a chamber without contact with the external air or with that which it is desired to disinfect, substantially as described.

Second, The air conduit, C D H, or its equivalent, applied in combination with a fan or other blower, B, a refrigerating chamber, F, and with the deck or other part, A, of a vessel or other closed space, substantially in the manner herein specified, so that the air, while passing through said conduit, will become cooled and flow into said vessel or other closed space, without coming in contact with the ice or freezing mixture contained in the ice chamber.

Third, The arrangement of the rotary hollow shaft, E, with chambers, e, apertures, g g′, and drums, G, with abutments, h, in combination with the fan blower, B, or its equivalent tubes, C and H, and with the refrigerating chamber, F, constructed and operating in the manner and for the purpose substantially as herein specified.

1,655.—Tape for Spring Skirts.—L. S. Scofield, Boston, Mass., assignee of T. D. Hoxsey, Paterson, N. J. Patented Feb. 12, 1861:

I claim the combination of the longitudinal sack, B (made either as a continuous pocket or composed of a series of pockets or loops), running lengthwise through the tape, with the transverse bags or pockets, P.

1,656.—Preserve Can.—N. P. Stanton, New York City, assignee of W. D. Ludlow. Patented June 28, 1859:

I claim, first, The employment or use for closing a can or vessel for preserving provisions, &c., of a key or cross-bar, D, and lugs, E E, attached to the inner side of a rim or cavity, a, on the can to prevent the disruption of said lugs, in closing the can and to avoid projections.

Second, The use of a convex cover, C, in combination with a cross-bar, D, or its equivalent, applying the force by which said cover is held down to or about the center of the same.

Third, In combination with a can or vessel, A, cover, C, and lugs, E E, I claim the elastic cross-bar, D, pivoted to the cover, C, and adapted to hold it down with a yielding pressure, as explained.

[This invention relates to the means employed for securing the cover down upon the neck of the can or vessel.]

1,657.—Grain Separator.—Joseph Van Houten, Mount Morris, N. Y. Patented Dec. 22, 1863:

I claim, first, Providing the upper end of wheat sieves, C, with an adjustable plate or covering, D, substantially in the manner and for the purposes set forth.

Second, So constructing and arranging the adjustable division plate, E, that one edge may be raised or lowered within the groove, c, substantially as described and for the purposes set forth.

DESIGNS.

1,932.—Trade-mark.—D. F. Packer, Pittsburgh, Pa.

1,933.—Ornate Letters.—W. H. Page (assignor to W. H. Page & Co.), Norwich, Conn.

1,934, 1,935 and 1,936.—John Rogers.—Group of Figures. (Three cases).

NOTE.—The number of patents issued last week and recorded above, including five designs and five re-issues, amounts to one hundred and twenty-six. Of this number FIFTY-FIVE of the cases were prepared at this office and obtained through the Scientific American Patent Agency.]

PATENTS

GRANTED

FOR SEVENTEEN YEARS!

MUNN & COMPANY,

In connection with the publication of the SCIENTIFIC AMERICAN, have acted as Solicitors and Attorneys for procuring "Letters Patent" for *new inventions* in the United States and in all foreign countries during the past *seventeen years*. Statistics show that nearly ONE-THIRD of all the applications made for patents in the United States are solicited through this office; while nearly THREE-FOURTHS of all the patents taken in foreign countries are procured through the same source. It is almost needless to add that, after *seventeen years'* experience in preparing specifications and drawings for the United States Patent Office, the proprietors of the SCIENTIFIC AMERICAN are perfectly conversant with the preparation of applications in the best manner, and the transaction of all business before the Patent Office; but they take pleasure in presenting the annexed testimonials from the three last ex-Commissioners of Patents:—

MESSRS. MUNN & CO.:—I take pleasure in stating that, while I held the office of Commissioner of Patents, MORE THAN ONE-FOURTH OF ALL THE BUSINESS OF THE OFFICE CAME THROUGH YOUR HANDS. I have no doubt that the public confidence thus indicated has been fully deserved, as I have always observed, in all your intercourse with the office, a marked degree of promptness, skill, and fidelity to the interests of your employers. Yours very truly,

CHAS. MASON.

Judge Mason was succeeded by that eminent patriot and statesman, Hon. Joseph Holt, whose administration of the Patent Office was so distinguished that, upon the death of Gov. Brown, he was appointed to the office of Postmaster-General of the United States. Soon after

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entering upon his new duties, in March, 1859, he addressed to us the following very gratifying letter:

MESSRS. MUNN & CO.:—It affords me much pleasure to bear testimony to the able and efficient manner in which you discharged your duties as Solicitors of Patents, while I had the honor of holding the office of Commissioner. Your business was very large, and you sustained (and I doubt not justly deserved) the reputation of energy, marked ability, and uncompromising fidelity in performing your professional engagements.

Very respectfully, your obedient servant, J. HOLT.

Hon. Wm. D. Bishop, late Member of Congress from Connecticut, succeeded Mr. Holt as Commissioner of Patents. Upon resigning the office he wrote to us as follows:

MESSRS. MUNN & CO.:—It gives me much pleasure to say that, during the time of my holding the office of Commissioner of Patents, a very large proportion of the business of inventors before the Patent Office was transacted through your agency; and that I have ever found you faithful and devoted to the interests of your clients, as well as eminently qualified to perform the duties of Patent Attorneys with skill and accuracy. Very respectfully, your obedient servant,

WM. D. BISHOP.

THE EXAMINATION OF INVENTIONS.

Persons having conceived an idea which they think may be patentable, are advised to make a sketch or model of their invention, and submit it to us, with a full description, for advice. The points of novelty are carefully examined, and a written reply, corresponding with the facts, is promptly sent, free of charge. Address MUNN & CO., No. 37 Park Row, New York.

As an evidence of the confidence reposed in their Agency by inventors throughout the country, Messrs. MUNN & CO. would state that they have acted as agents for more than TWENTY THOUSAND inventors! In fact, the publishers of this paper have become identified with the whole brotherhood of inventors and patentees, at home and abroad. Thousands of inventors for whom they have taken out patents have addressed to them most flattering testimonials for the services rendered them; and the wealth which has inured to the individuals whose patents were secured through this office, and afterwards illustrated in the SCIENTIFIC AMERICAN, would amount to many millions of dollars! Messrs. MUNN & CO. would state that they never had a more efficient corps of Draughtsmen and Specification Writers than those employed at present in their extensive offices, and that they are prepared to attend to patent business of all kinds in the quickest time and on the most liberal terms.

PRELIMINARY EXAMINATIONS AT THE PATENT OFFICE.

The service which Messrs. MUNN & CO. render gratuitously upon examining an invention does not extend to a search at the Patent Office, to see if a like invention has been presented there; but is an opinion based upon what knowledge they may acquire of a similar invention from the records in their Home Office. But for a fee of $5, accompanied with a model, or drawing and description, they have a special search made at the United States Patent Office, and a report setting forth the prospects of obtaining a patent, &c., made up and mailed to the inventor, with a pamphlet, giving instructions for further proceedings. These preliminary examinations are made through the Branch Office of Messrs. MUNN & CO., corner of F. and Seventh streets, Washington, by experienced and competent persons. Many thousands of such examinations have been made through this office, and it is a very wise course for every inventor to pursue. Address MUNN & CO., No. 37 Park Row, New York.

HOW TO MAKE AN APPLICATION FOR A PATENT.

Every applicant for a patent must furnish a model of his invention if susceptible of one; or, if the invention is a chemical production, he must furnish samples of the ingredients of which his composition consists, for the Patent Office. These should be securely packed, the inventor's name marked on them, and sent, with the Government fees, by express. The express charge should be pre-paid. Small models from a distance can often be sent cheaper by mail. The safest way to remit money is by a draft on New York, payable to the order of Messrs. MUNN & CO. Persons who live in remote parts of the country can usually purchase drafts from their merchants on their New York correspondents; but, if not convenient to do so, there is but little risk in sending bank bills by mail, having the letter registered by the postmaster. Address MUNN & CO., No. 37 Park Row, New York.

Patents are now granted for SEVENTEEN years, and the Government fee required on filing an application for a patent is $15. Other changes in the fees are also made as follows:—

On filing each Caveat	$10
On filing each application for a Patent, except for a design	$15
On issuing each original Patent	$20
On appeal to Commissioner of Patents	$20
On application for Re-issue	$30
On application for extension of Patent	$50
On granting the Extension	$50
On filing a Disclaimer	$10
On filing application for Design (three and a half years)	$10
On filing application for Design (seven years)	$15
On filing application for Design (fourteen years)	$30

The Patent Laws, enacted by Congress on the 2d of March, 1861, are now in full force, and prove to be of great benefit to all parties who are concerned in new inventions.

The law abolishes discrimination in fees required of foreigners, excepting natives of such countries as discriminate against citizens of the United States—thus allowing Austrian, French, Belgian, English, Russian, Spanish and all other foreigners, except the Canadians, to enjoy all the privileges of our patent system (except in cases of designs) on the above terms. Foreigners cannot secure their inventions by filing a caveat; to citizens only is this privilege accorded.

CAVEATS.

Persons desiring to file a caveat can have the papers prepared in the shortest time by sending a sketch and description of the invention. The Government fee for a caveat is $10. A pamphlet of advice regarding applications for patents and caveats is furnished gratis, on application by mail. Address MUNN & CO., No. 37 Park Row New York.

EXTENSION OF PATENTS.

Many valuable patents are annually expiring which might readily be extended, and if extended, might prove the source of wealth to their fortunate possessors. Messrs. MUNN & CO. are persuaded that very many patents are suffered to expire without any effort at extension, owing to want of proper information on the part of the patentees, their relatives or assigns, as to the law and the mode of procedure in order to obtain a renewed grant. Some of the most valuable grants now existing are *extended patents*. Patentees, or, if deceased, their heirs, may apply for the extension of patents, but should give ninety days' notice of their intention.

Patents may be extended and preliminary advice obtained, by consulting or writing to MUNN & CO., No. 37 Park Row, New York.

REJECTED APPLICATIONS.

Messrs. MUNN & CO. are prepared to undertake the investigation and prosecution of rejected cases, on reasonable terms. The close proximity of their Washington Agency to the Patent Office affords them rare opportunities for the examination and comparison of references, models, drawings, documents, &c. Their success in the prosecution of rejected cases has been very great. The principal portion of their charge is generally left dependent upon the final result.

All persons having rejected cases which they desire to have prosecuted, are invited to correspond with MUNN & CO., on the subject, giving a brief history of the case, inclosing the official letters, &c.

ASSIGNMENTS OF PATENTS.

The assignment of patents, and agreements between patentees and manufacturers, carefully prepared and placed upon the records at the Patent Office. Address MUNN & CO., at the Scientific American Patent Agency, No. 37 Park Row, New York.

It would require many columns to detail all the ways in which the Inventor or Patentee may be served at our offices. We cordially invite all who have anything to do with patent property or inventions to call at our extensive offices, No. 37 Park Row, New York, where any questions regarding the Rights of Patentees, will be cheerfully answered.

Communications and remittances by mail, and models by express (prepaid) should be addressed to MUNN & CO. No. 37 Park Row, New York

Notes and Queries

C. G., of Ohio.—The diagrams you sent us of the steam engines in your vicinity have been received. If the drawings had been made to scale, and accompanied by the bore of cylinder, length of stroke, pressure of steam, and revolutions per minute, we should have been able to give a satisfactory answer. As you have drawn the diagrams there is too much "lead" on the exhaust side of the valve. The diagram marked No. 2 is also incorrect from the reason that you have gone to the other extreme and put too much "lap" on the exhaust. For common work, where fuel is plenty, let the exhaust side have about the same "lead" the steam side has, then the steam will "punch" the piston through to the end of the stroke, and the exhaust will be as free to go out as the live steam is to enter. Advising about a steam engine, without seeing it, is about as satisfactory to an engineer as prescribing for an absent patient would be to a physician. There may be a complication of disorders which affect the whole system.

C. C., of Conn.—Your improvement in sewing machines does not appear to embrace anything new, and we advise you not to apply for a patent. We send you by mail one of our pamphlets of advice how to make application for a patent.

W. T. S., of Mo.—Your suggestions in regard to the Atlantic telegraph appear to us reasonable, but we presume the points have been fully considered by the manufacturers.

E. W., of Mass.—If you succeed in making a gas engine work economically for any purpose, under any conditions, we should be much pleased to receive a description of it.

W. P. B., of Wis.—The excitement about gravel-wall buildings seems to have died away. It always seemed to us that this material must be more expensive and less durable than brick. In Texas, however, whole villages were built of it, and seemed to stand very well. There they have no severe frosts.

J. D. H., of Ill., and H. H., of Ohio.—We have seen several testimonials in favor of the use of Winan's incrustate powders as a safe remedy to remove scale from boilers. It appears to us to be a good article for the purpose. His office is at No. 11 Wall street, this city.

S. L. H., of Ill.—We are obliged for your diagram of the drill, but do not think it sufficiently novel to publish, as the principle of it is similar to one already illustrated. Write again.

C. T. C., of Pa.—Address H. C. Baird, 406 Walnut street, for "Practical Mechanical Engineering." The price is six dollars, and it is a most useful book for all mechanics.

Money Received.

At the Scientific American Office, on account of Patent Office business, from Wednesday, April 20, 1864, to Wednesday April 27, 1864:—

C. H. R., of N. Y., $25; H. P. T., of U. S. N., $41; J. S. C., of N. Y., $25; A. W., of N. J., $25; J. P. N., of Maine, $30; W. H. McM., of N. Y., $56; J. R. G., of Ill., $20; A. H. W., of Mich., $20; A. M. C., of Conn., $45; H. M., of N. H., $45; D. F. H., of Mass., $15; E. T. S., of N. Y., $60; H. G. D., of Ky., $20; A. J., of Ind., $16; L. & L., of Ohio, $32; R. P., of Maine, $28; J. M. A., of Mass., $15; S. W., of Pa., $25; D B. W., of Mass., $16; W. B., of Mass., $25; W. W., of Cal., $18; J. E. H., of Mich., $16; W. P. B., of Mich., $15; L. M., of Ill., $25; J. F. A., of Wis., $16; D. B. T., of Wis., $30; L. H., of Va., $10; S. Z. H., of N. J., $28; P. D., of N. Y., $25; E. F. R., of N. Y., $31; C. R., of N. Y., $41; E. S., of N. Y., $25; T. W. C., of N. Y., $25; G. B. B., of Ind., $20; B. T. M., of Conn., $20; B. R. A., of N. Y., $10; A. E. W., of Ill., $20; H. T. L., of N. J., $45; G. E. W., of R. I., $20; Mrs. S. A. M., of N. Y., $45; S. W., of Wis., $25; J. C. C., of Nebraska Territory, $10; E. H., of Mass., $31; J. R. A., of R. I., $25; S. E. B., of Mass., $32; W. G. R., of Mo., $25; B. L., of Mich., $35; P. D. S., of N. F., $19; J. J. G., of Ohio, $250; T. S., of N. Y., $29; A. H. S., of N. Y., $26; G. J. B, of Ind., $16; J. H. Jr., of Mich., $25; L. J., of Vt., $16; S. L. G., of Conn., $16; F. S. G., of N. Y., $41; J. M. J., of N. Y., $42; G. W. W., of N. Y., $25; S. DeM., of Md., $41; A. B. G., of N. Y., $20; T. D. H., of Conn., $20; C. J., of Conn., $45; P. & Bros., of Conn., $50; S P. B., of N. Y., $20; C. R., of N. J., $20; D. B. M., of Ohio, $16; B. M. B., of N. Y., $16; J. A. M., of N. Y., $44; G. S., of Ky., $25; R. S., of N. Y., $25; W. D. A., of Iowa, $20; A. W., of Vt., $40; H. F. T. H., of Wis., $16; R. D., of Mass., $30; H. V. B., of N. Y., $25; J. W. S., of Mass., $25; Z. S. S., of N. Y., $16; E. T. J., of Vt., $25; T. L. M., of Ohio, $25; T. B. F., of Mass., $16; T. C., of Mass., $25; N. & B., of Iowa, $60; J. H., of Conn., $28; E. B. R., of N. J., $25; H. L., of N. Y., $25; H. & S., of Pa., $20; S. & C., of N. Y., $40; T. K. M., of Conn., $25; A. B. B., of N. Y., $10; J. T. M., of Ill., $25; F. G. A., of — $16; W. H. McM., of N. Y., $25; H. S., of N. J., $16; G. A. E., of Mass., $20; A. R., of N. Y., $54; D. H. S., of Iowa, $25; H. H., of Mass., $25; S. H., of Ill., $32; A. M. W., of Mass., $25.

Persons having remitted money to this office will please to examine the above list to see that their initials appear in it and if they have not received an acknowledgment by mail, and their initials are not to be found in this list, they will please notify us immediately, stating the amount and how it was sent, whether by mail or expre .

Specifications and drawings and models belonging to parties with the following initials have been forwarded to the Patent Office, from Wednesday, April 20, 1864, to Wednesday, April 27, 1864:—

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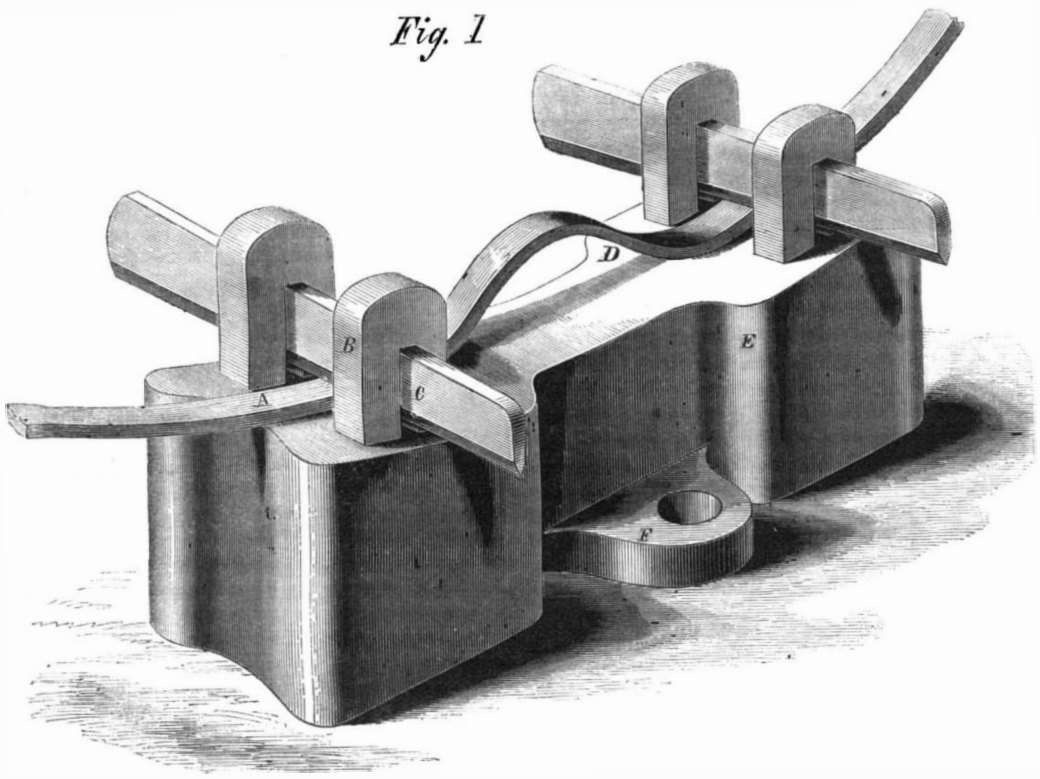
Improved Machine for upsetting Tires.

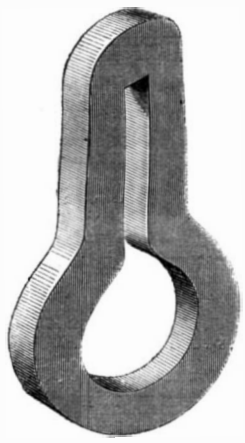
We present our readers this week with a view of Dole's arrangement for upsetting tires for wagons or other wheels. The engravings represent the machine very perfectly. The operation is performed by inserting the tire, A, between two sets of lugs, B, provided with keys, C; the tire, having previously been formed with a bend in it as at D, is held tightly by the keys while the blacksmith sets the bend down, which being hot compresses the metal together and thus shortens the tire. The lugs, B, are made of wrought iron, and are formed into a loop at the bottoms, as in Fig. 2; they are set in the mold when the anvil or bed, E, is cast, and are kept in place by the casting surrounding them. By this method of construction a very strong link is secured. The keys are of steel, and have V-shaped edges so that they bite into the metal of the tire and hold it in place firmly, and the anvil has lugs, F, by which it may be bolted down to a firm foundation. This is a very convenient and useful machine, and will accomplish the object for which it was intended. It was patented on Jan. 12, 1864, by L. A. Dole, of Salem, Ohio. For further information address Dole & Silver, at that place.

Fig. 1



DOLE'S MACHINE FOR UPSETTING TIRES.

Fig. 2



The Product of Petroleum.

The Buffalo *Commercial Advertiser*, of April 15th, contains a very long "Oil Circular," by F. S. Pease of Buffalo, from which we gather the following statements:—

"The exports of petroleum from the United States for the year 1863 have been large—28,250,721 gallons, against 10,955,991 gallons in 1862. The product of the wells is set down at 2,000,000 bbls., or 80,000,000 gallons for the year, being 10,643,735 gallons more than in 1862. California seems to be well supplied with asphaltum and petroleum, both of which exist in large quantities. Immense beds of the former are found on the sea-shore in the vicinity of Santa Barbara, and is used largely in the construction of sidewalks, roofing, &c., at San Francisco. Some 18 miles west of Buena Vista Lake, an extensive deposit of asphaltum has been found, boiling up from numerous springs, being warm and in a fluid state when it comes to the surface, and of a dark and viscid color. During the last year another extensive spring has been discovered near Pyramid Lake. On the coast, petroleum springs are met with at Santa Cruz, and San Pable, in Contra Costa county, 10 miles from San Francisco. The Conway Petroleum Association has bored several wells, one of which discharges considerable quantities of oil. In Santa Clara county, oil springs have been found near the Los Cates Creek."

Migration of the Stump of a Tooth.

A young lady, who was sent some months since to M. Delistre by one of his friends, had on the left side of the palate, on a line with the first molar, which was absent at one-third of an inch from the edge of the gums, a mass of substance regularly rounded off, blackish, of the size of a small pea, with regular edges. Several doctors had been consulted, and the affection looked upon by them as caries of the maxillary, had been submitted to different kinds of treatment, all of which had been of no avail. M. Delistre tried to find out by the help of a stylet what affection he had to deal with. This instrument hit on an uneven mass, which gave neither the crepitation of caries nor the roughness of a sequestrum. On pressing heavily all around he thought he felt it moving slightly, and introducing the two very slender points of a pincers for extracting stumps, to his great astonishment he drew out the root of a tooth nearly one-third of an inch in size. This root evidently came from the first molar; it had made its way through the maxillary bone, and had placed itself perpendicularly to the roof of the palate. The patient having been seen a fortnight afterward, was perfectly cured.—*Dublin Medical Press.*

THE JAPAN VARNISH TREE.—*Le Moniteur Illustre des Inventions* recommends the introduction into France of the Ailanthus tree (*rhus vernix*), which yields the Japan varnish. This is not the same as the silk-worm Ailanthus. It is cultivated in Japan and China, and could doubtless be raised to any extent in this country. The varnish is procured by making an incision in the trunk in the same way that is practiced in gathering pitch from the pine. The yield is said to be very large, and there is every prospect that the cultivation of the tree would be profitable.

A Furnace falling into a Coal Mine.

A very startling occurrence happened recently, near Wolverhampton, England. When the charge was nearly ready for being drawn off, one of the three blast furnaces at Rough Hills, belonging to Messrs. Aston and Shaw, suddenly fell into ruins. The furnaces were put up on an old colliery, the crust of which is only about seventeen yards thick; and it is thought that the pillars in the bottom coal, which was found at this distance, had been taken from either beneath the furnace or else so near to it as to gradually draw it down, but it had previously exhibited no evidence of danger. Two men were sadly burnt by the accident.

HAIR-DRESSING.—Ladies will find the mode of plaiting eight strands, illustrated and described on page 244 of the SCIENTIFIC AMERICAN, current volume, a handsome way for dressing their braids.

THERE are one hundred and forty-nine shoe establishments and thirteen kid and morocco houses in Lynn, Mass. The internal tax on this department of manufactures amounted last year to $252,759.

THE

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FOR 1864!

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